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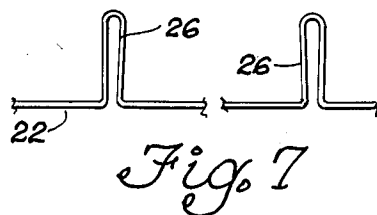
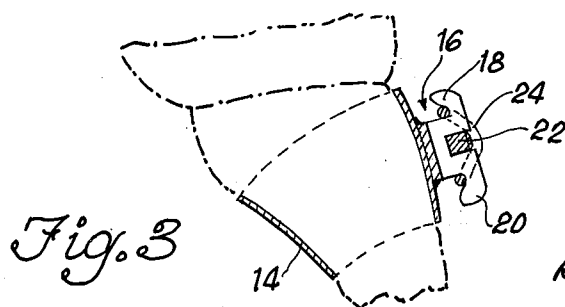
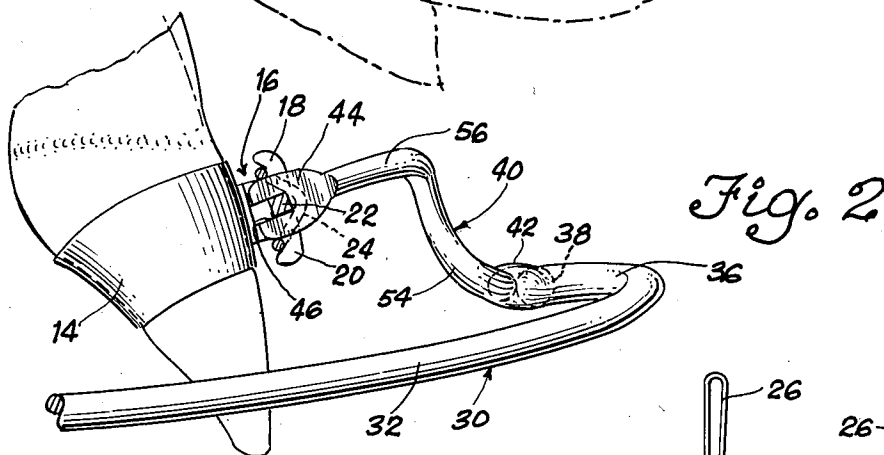
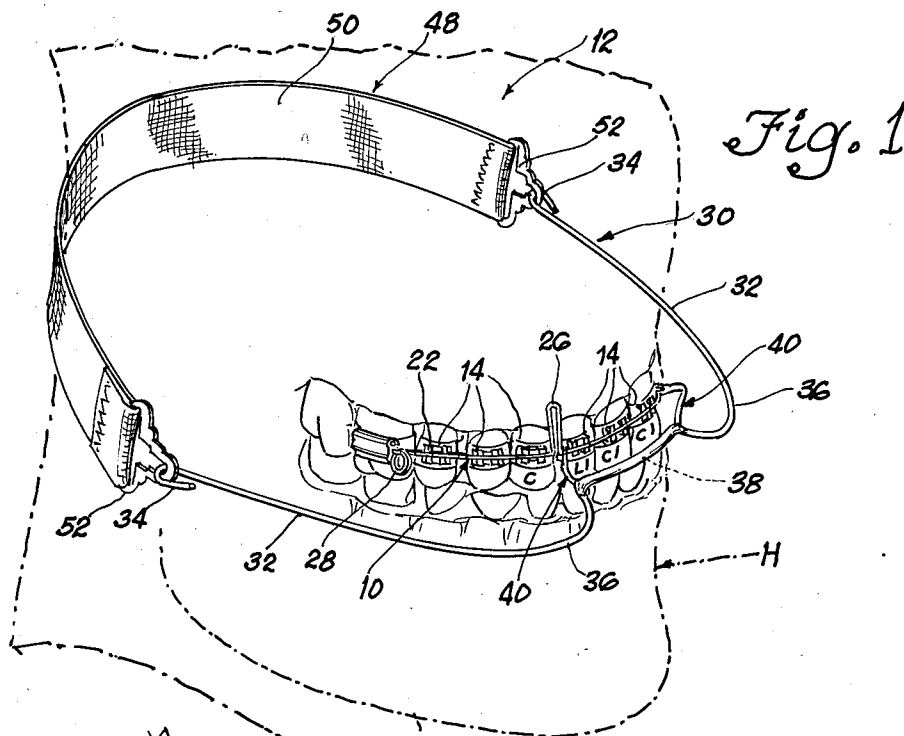
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3,087,245

ORTHODONTIC TORQUING METHOD AND APPARATUS

Filed March 14, 1962

2 Sheets-Sheet 1



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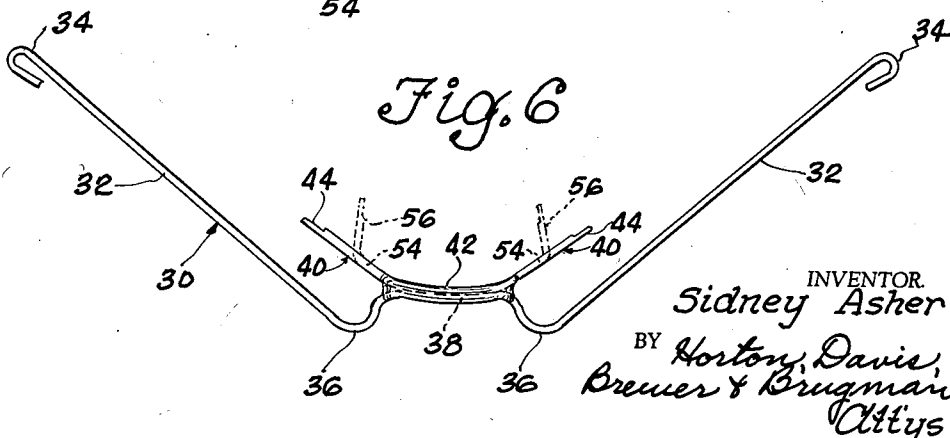
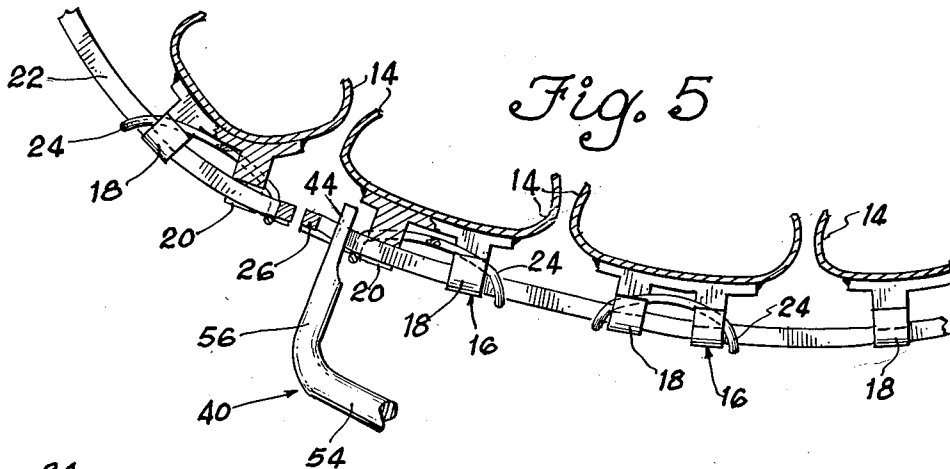
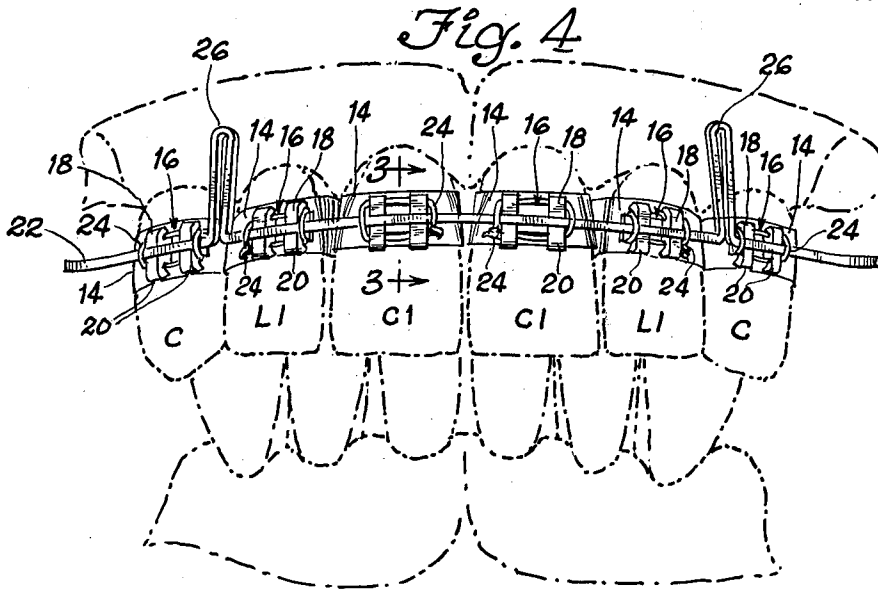
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ORTHODONTIC TORQUING METHOD AND APPARATUS

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2 Sheets-Sheet 2



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ORTHODONTIC TORQUING METHOD AND APPARATUS

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6 Claims. (Cl. 32-14)

This invention relates to novel orthodontic methods and means for correcting and finishing the alignment and positioning of the upper teeth at the beginning, middle or end of orthodontic treatment.

For many years orthodontic arches, colloquially known as "braces," have been applied to patients' teeth by orthodontists and dentists to correct a variety of conditions. By making adjustments in various parts of the arches and by using various supplemental tools and devices, orthodontists and dentists have been able to effect changes in patients' mouths which changes have been necessary from either or both of a functional viewpoint and a cosmetic or aesthetic point of view, as well as for stability of the occlusion.

One of the specific techniques used by orthodontists to correct certain conditions is known as torquing. By torquing is meant the unleashing of a twist in orthodontic wires. That results in the lingual movement of the roots of the upper incisor teeth, that is, moves those teeth towards the tongue in a generally vertical plane so that the tips of the roots are moved rearwardly a distance substantially greater than the crown, the biting edge, is moved. It is a technique most frequently utilized in reorienting the four upper incisors, the four central teeth.

If lingual movement of the roots of the upper incisors is not accomplished or is incorrectly accomplished when correcting a case of malocclusion, then there is a strong possibility that the crowns of these teeth may drift forward into a protrusion, somewhat like the original case. Thus, to insure permanency of the orthodontic correction, torquing is frequently indicated. Torquing will provide, for many patients, a more aesthetic final occlusion and will achieve a better ultimate occlusion.

The only means which has ever become popular and useful for torquing utilizes one of the elements of the orthodontic arch itself as the twisting means. That method will be described and discussed in greater detail hereinafter. The invention herein avoids certain of the very serious difficulties and disadvantages in that currently used method and introduces advantages not obtainable with those commonly used methods and means.

This invention contemplates the use of what is known as a "face-bow" to bring about torquing of the upper incisors. A face-bow can be described generally as a device which is adjusted periodically by an orthodontist and which is readily and easily attachable to, and removable from, an orthodontic arch by the patient himself. Since the face-bow is constructed so that it extends outside of the patient's mouth and since it is fastened around the back of the patient's head, it is obvious that face-bows are intended principally for use at night and in the privacy of a patient's home, although their use is not so limited. By utilizing an orthodontic arch having certain of its parts relatively immovable with respect

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to each other and certain parts thereof relatively immovable with respect to the novel face-bow of this invention in the manner to be described, it is possible to secure torquing by using a face-bow.

Using the novel means and methods described herein it is possible to secure more effective, more uniform and more positive torquing than has been possible in the past, while at the same time avoiding the disadvantages inherent in the prior art methods and means.

It is, therefore, an object of this invention to provide a novel, more effective method for accomplishing torquing where torquing is indicated.

It is a further object of this invention to provide a novel method for torquing wherein a portion of the orthodontic arch itself is gripped and is twisted, the twisting forces being transmitted to the teeth themselves whereby over an extended period, lingual movement of the roots of the teeth is secured.

Yet another object of this invention is to provide a method for lingually moving the upper incisors by gripping an orthodontic arch attached to those teeth and by applying a twisting force to a portion of the orthodontic arch for an extended period of time.

A further object of this invention is to provide for use in combination with an orthodontic arch having an orthodontic wire, means for gripping and for twisting the orthodontic wire whereby the apices of the teeth are moved lingually a distance substantially greater than the crowns of said teeth.

Another object of this invention is to provide for use in combination with an orthodontic arch attached to the upper incisors of a patient, said orthodontic arch having an orthodontic wire, means for gripping said orthodontic arch wire and for twisting said orthodontic arch wire whereby lingual movement of the roots of said upper incisors is accomplished.

Another object contemplated by this invention is the provision of a novel face-bow useful for imparting twisting forces to an orthodontic arch which face-bow includes a frame member having two rearwardly extending arms each terminating at one end in a hook and at the other end in a U-shaped segment, further including a rearwardly extending orthodontic arch wire engaging lever adjacent each of said U-shaped segments, said levers terminating in means for gripping and for twisting said orthodontic arch wire when the face-bow is properly positioned and anchored within a patient's mouth.

Yet another object of this invention is to provide in combination with an orthodontic arch having an orthodontic wire, means for gripping and for twisting the orthodontic wire whereby the apices of the teeth are moved lingually a distance substantially greater than the crowns of said teeth.

Still another object of this invention is to provide in combination with an orthodontic arch attached to the upper incisors of a patient said orthodontic arch having an orthodontic wire, means for gripping said orthodontic wire and for twisting said orthodontic wire whereby lingual movement of the roots of said upper incisors is accomplished.

Still further objects and advantages of this invention will become apparent from the following description and drawings of which:

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FIG. 1 is a perspective view of a preferred embodiment of this invention, which view shows the face-bow of this invention in operative relationship to an orthodontic arch;

FIG. 2 is an enlarged view of one of the teeth of FIG. 1, of the cap on the tooth, and of a portion of the face-bow;

FIG. 3 is a vertical sectional view taken substantially along line 3—3 of FIG. 4;

FIG. 4 is a partial enlarged front perspective view of FIG. 1 showing part of the orthodontic arch;

FIG. 5 is a partial enlarged horizontal section of FIG. 1 taken along the upper edge of the orthodontic wire;

FIG. 6 is the face-bow of this invention, which is suitable for shaping for use in practicing the method of this invention and useful in the combination of this invention, showing one of its adjustments in phantom; and

FIG. 7 shows part of the orthodontic wire of FIG. 1.

Referring first to FIG. 1, there is shown a patient's head H in phantom, to which patient's head and mouth the face-bow of this invention has been fitted. For convenience the six upper anterior teeth have been designated by the letters CI (Central Incisors), LI (Lateral Incisors) and C (Canines). FIG. 1 shows generally an orthodontic arch 10 and a face-bow assembly 12.

Orthodontic arch 10 includes tooth caps 14 secured to a number of the teeth. Each of the caps is provided at its front with a bracket 16 which bracket has an upper outwardly extending bracket element 18, divided into two horizontally spaced segments, and a lower outwardly extending bracket element 20, also divided into two horizontally spaced segments.

Between the upper and lower bracket elements 18 and 20 of brackets 16, the orthodontic arch wire (arch wire) 22 is disposed. The arch wire utilized in the preferred embodiment of this invention is rectangular in cross-section and is of such dimensions that it fits snugly between the upper and lower bracket elements. The facing surfaces of the forwardly extending bracket elements 18 and 20, that is, the opposed surfaces against which the arch wire 22 rests (as best seen in FIGS. 2, 3 and 5) are generally flat and parallel to each other to assist in maintaining a snug fit between the brackets and the arch wire.

To keep the arch wire between the bracket elements 18 and 20, it is tied to each bracket 16 by a tie wire 24. Tie wires 24 are looped around the arch wire and tied to brackets 16 in a conventional manner clearly discernible from FIGS. 2 to 5.

Arch wire 22 is provided at each side with a loop 26. As shown in FIG. 1, loops 26 are located in the spaces between the lateral incisors and canines. At caps 14, on two of the posterior teeth, two of the molars, the ends of the arch wire are provided with stops 28 which prevent posterior movement of the arch wire with respect to the caps of those molars.

The face-bow of this invention includes a continuous frame 30 which includes rearwardly extending arms 32 and hooks 34 at the ends of each of the rearwardly extending arms, U-shaped segments 36 and a central portion 38. Attached adjacent the central portion 38 are two arch wire engaging levers 40, each of which is rigidly connected at one end to the central portion 38 of frame 30 by silver solder 42. At the free end of each of the levers 40 there is provided a portion of flattened and reduced cross-section known as a fork 44. Each fork 44 has a rectangular opening or lumen 46. The arch wire fits within the lumens 46 of forks 44 and contacts the portions of the forks defining the lumens. A tight or snap fit between the arch wire and the forks is provided and is adjusted by the operator to the exact arch wire which he uses.

Completing the face-bow assembly 12 is a neck strap 48 for retaining it in its operative position. Neck strap 48 has a strap band 50 which is disposed at the rear of a patient's neck and a strap hook 52 fixed at each end

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of the band 50. Strap hooks 52 are adapted to mate with frame hooks 34 as is shown in FIG. 1.

Although the orthodontic arch has been described, the arch itself is applied in any well known manner familiar to those skilled in the art of orthodontics and may be a conventional arch. However, one requirement of the preferred embodiment illustrated is that the arch wire used be rectangular in cross-section.

The arch wire 22 must be of substantially the same width as the distance between the inner generally flat opposing surfaces of the upper and lower bracket elements 18 and 20, the space in which the arch wire is received. The reason for that is to prevent circumferential or rotational movement of the arch wire with respect to the brackets 16 when arch wire 22 is twisted in the manner to be described.

The twisting force is imparted to the teeth through a suitably adjusted face-bow assembly 12. A face-bow embodying the principles of this invention is shown in FIG. 6 and utilizes a 304 stainless steel 0.061" frame wire, 304 stainless steel 0.050" lever arms, silver solder to connect the elements, and flattened forks having a lumen of about 0.023" x 0.030".

An orthodontist or dentist, having decided that torquing is indicated and desiring to use the methods and means of this invention should first make certain an arch wire such as that described is made part of the orthodontic arch. It is then necessary to procure a face-bow which can be adjusted to apply a twisting force in the manner to be described. A partially adjusted face-bow of this invention is shown in phantom in FIG. 6.

As shown in FIGS. 1 and 2, the face-bow of FIG. 6 has had the arms 32 of frame 30 bent inwardly of the hooks 34 slightly. That inward bending is principally to conform the face-bow of this invention to the sides of the face and cheeks.

To provide the proper torquing effect it may be necessary to make suitable adjustments both in levers 40 and to the plane in which the arms 32 lie. Important considerations in those as well as in all of the adjustments made in the various parts of the face-bow are the shape of the patient's mouth, the shape and dimensions of the patient's lips and the size and spacing of the patient's teeth.

As best seen in FIG. 2 the frame engaging segments 54 of levers 40 have been bent from the position shown in FIG. 6 upwardly adjacent the central portion 38 of frame 30. Adjacent the rearwardly extending ends of frame engaging segments 54, levers 40 are bent rearwardly and inwardly, terminating in fork carrying segments 56. By properly adjusting the relative lengths of the segments of levers 40 and their relative angular orientations, as well as the disposition of arms 32, the forks 44 can be disposed to grip the arch wire and to apply a twisting force to the orthodontic wire adjacent the teeth to be repositioned. That is best seen in FIG. 2 where lingual stresses are shown as being exerted against the teeth through the medium of the caps, brackets and arch wire.

It is apparent that if torquing is to occur there must be a snug fit not only between the brackets 16 and the arch wire 22, but also between the forks 44 and the arch wire 22. Therefore, to assure a proper fit the lumens 46 must be of substantially the same dimensions as the arch wire. When all of the adjustments have been completed and the face-bow has been fitted and activated, the forks should be squeezed with a pair of straight beaked pliers until the lumens are reduced to a size where a snap fit between the forks and the arch wire is provided.

Thus it is that relative rotational movement between forks 44 and arch wire 22 is impossible and relative rotational movement between the brackets 16 and the arch wire 22, is also impossible. Because of that, any twisting movement imparted to the wire by the face-bow of this invention is directly transmitted to the teeth.

To accomplish fully the purposes of this invention the

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orthodontic wire should be provided with loops such as loops 26. These loops lie just anterior of, or mesial to, the canine brackets and extend upwardly adjacent, but not impinging upon, the gums and are oriented so that they do not interfere with lip movement.

For the most rapid completion of torquing, the arch wire 22 should be fitted in the mouth with the loops provided at the proper points. Once fitted, the arch wire should be removed and pre-softened at the points at which loops 26 commence. That may be done by heating the wire at those points with an orthodontic pin-point flame and then air-cooling the wire. Then the arch wire is inserted in the mouth and tied in place.

Loops 26 serve two purposes. First they permit accomplishment of the novel method of torquing and render more effective the face-bow of this invention. Secondly, the loops prevent the twisting forces exerted upon the teeth from being transmitted to the posterior teeth with the deleterious effects that have attended prior art attempts to torque.

Similar loops have served in the past as the sole means for torquing, in which cases the loops have been adjusted to act as springs to urge the arch wire in such directions that torquing would be accomplished. That is undesirable because the forces reactive to the forces have tended to displace and relocate the posterior teeth, something which is generally undesirable and deleterious. By utilizing the novel face-bow to provide all or the substantial portion of the torquing forces, such undesirable displacement of the posterior teeth is eliminated completely. As was suggested, however, on occasion it may be desirable to utilize the loops to provide some part of the torquing force. In such cases, a force insufficient to effect deleteriously the posterior teeth, may be used.

It is to be understood that one of the limiting factors in torquing, as in other orthodontic corrective techniques, is the threshold of pain for the particular patient. Therefore, in making the adjustments in the face-bow previously described it is necessary to check repeatedly all of the adjustments with the face-bow actually inserted in the patient's mouth and attached to the orthodontic wire as well as anchored in position by means of neck strap 48. When torquing, a maximum of 3 to 5 ounces of force should be transmitted by the neck strap and the forks of the face-bow to the arch wire.

It is apparent that a number of adjustments must be made in the face-bow to enable it to perform the functions of this invention. These include adjusting the force to be applied, as well as the depth of U-shaped bends 36 and the lengths of fork carrying segments 56 of levers 40. All of those depend in large measure upon the shape of the patient's head and lips and the width of his mouth, as well as the size of, and spacing between, the teeth. The length of the central portion 38 of frame 30 depends in part upon the width of the patient's mouth and in particular upon the spacing between the points on the orthodontic arch at which the orthodontist desires to engage the arch wire with the forks of the face-bow. The angles at which both the frame-engaging and fork-carrying segments 54 and 56 of the levers 40 are set, both in plan view and in side elevation, in large measure must be adjusted for the individual patient. Nevertheless, all of the adjustments must be such that lingual movement of the apices of the teeth is accomplished by gripping and twisting the orthodontic wire in the manner best shown in FIG. 2. Understanding that purpose and objective and the preferred means described herein whereby that purpose and objective may be achieved will render obvious to the dentist or orthodontist the degree of adjustment in the various elements of the orthodontic arch and face-bow necessary to practice the invention upon any given patient.

The method of torquing described herein and the face-bow used for practicing that method make available to

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the orthodontist a method far simpler and much more effective than the loop method of torquing now in use. The structure utilized is easier to adjust and enables necessary torquing to be completed much more rapidly, with less pain and with more positive control than with known structures and methods. Additionally, by using the face-bow described herein, automation (continued torquing) is possible where with conventional methods, such as the loop torquing method described, the torquing forces diminish rapidly and require much more frequent adjustment hence many more visits of the patient to the orthodontist's office.

Yet another advantage is in the fact that the torquing technique described herein is very positive, quite unlike the loop method in which torquing is completely the result of the action of springs.

The foregoing description of my invention will make obvious to others skilled in the orthodontic arts the fact that various minor changes may be made in the structure without departing from the spirit and scope of the invention. Thus, for example, any means whereby the bracket and arch wire, and forks and arch wire, respectively, may be maintained relatively rotationally immovable each with respect to the other whereby twisting forces applied to the wire will be transmitted to the tooth, will be satisfactory.

I claim:

1. A face-bow for use in torquing an orthodontic arch wire comprising a frame having two rearwardly extending arms terminating in hooks at one end, U-shaped segments at the other ends of the arms, and rearwardly extending orthodontic arch wire engaging levers connected to said frame adjacent said U-shaped segments, said levers terminating in means for gripping said orthodontic arch wire and for twisting said orthodontic arch wire.

2. An orthodontic method of lingually moving the roots of the upper anterior teeth of a patient wearing an orthodontic arch having an orthodontic arch wire comprising gripping the orthodontic arch wire adjacent the upper anterior teeth, and twisting the orthodontic arch wire lingually whereby upon continued twisting, the roots of the upper anterior teeth are moved lingually.

3. An orthodontic device for relocating the roots of the upper anterior teeth comprising, in combination, an orthodontic arch having an orthodontic arch wire, means engaging said orthodontic arch wire for gripping said orthodontic arch wire adjacent the upper anterior teeth and for twisting said orthodontic arch wire lingually, and means operatively connected to said gripping and twisting means for maintaining said gripping and twisting means in gripping and twisting relationship to said orthodontic arch for extended periods whereby the roots of the upper anterior teeth are moved lingually.

4. An orthodontic device for correcting malocclusion of the upper anterior teeth comprising an orthodontic arch having a plurality of caps, each of said caps having a forwardly extending bracket and an orthodontic arch wire of rectangular cross-section attached to the brackets, said orthodontic arch wire being immovable in a plane normal to its axis where it is attached to the brackets, means engaging said orthodontic arch wire for gripping the arch wire at two spaced points and for applying twisting force to said orthodontic arch wire at said two spaced points, and means operatively connected to said gripping and twisting means for maintaining said gripping and twisting means in said gripping and twisting relationship for extended periods of time, whereby the roots of the upper anterior teeth are moved lingually.

5. An orthodontic device for relocating the teeth of a patient comprising an orthodontic arch having an orthodontic arch wire, spaced means connected to said orthodontic arch wire for gripping said orthodontic arch wire, and means connected to said gripping means for applying a continuous twisting force to said arch wire whereby over

an extended period of time the patient's teeth are lingually relocated.

6. A face-bow for use in imparting twisting forces to an orthodontic arch having an orthodontic arch wire comprising a frame, said frame including two rearwardly extending arms each terminating at one end in a hook element and at the other end in a generally U-shaped segment, and a central portion interconnecting said U-shaped segments, and two rearwardly extending lever arms each fixed at one end with respect to the central portion of said frame, each of said lever arms terminating at its other end in a flattened fork having a substantially rectangular opening of substantially the same width as the orthodontic

arch wire with which the face-bow is to be used, said lever arms being bendable adjacent their centers and adjacent said central portion of said frame whereby when positioned and anchored to said orthodontic arch, the face-bow will twist said orthodontic arch and move the apices of a patient's teeth to which said orthodontic arch is connected lingually.

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