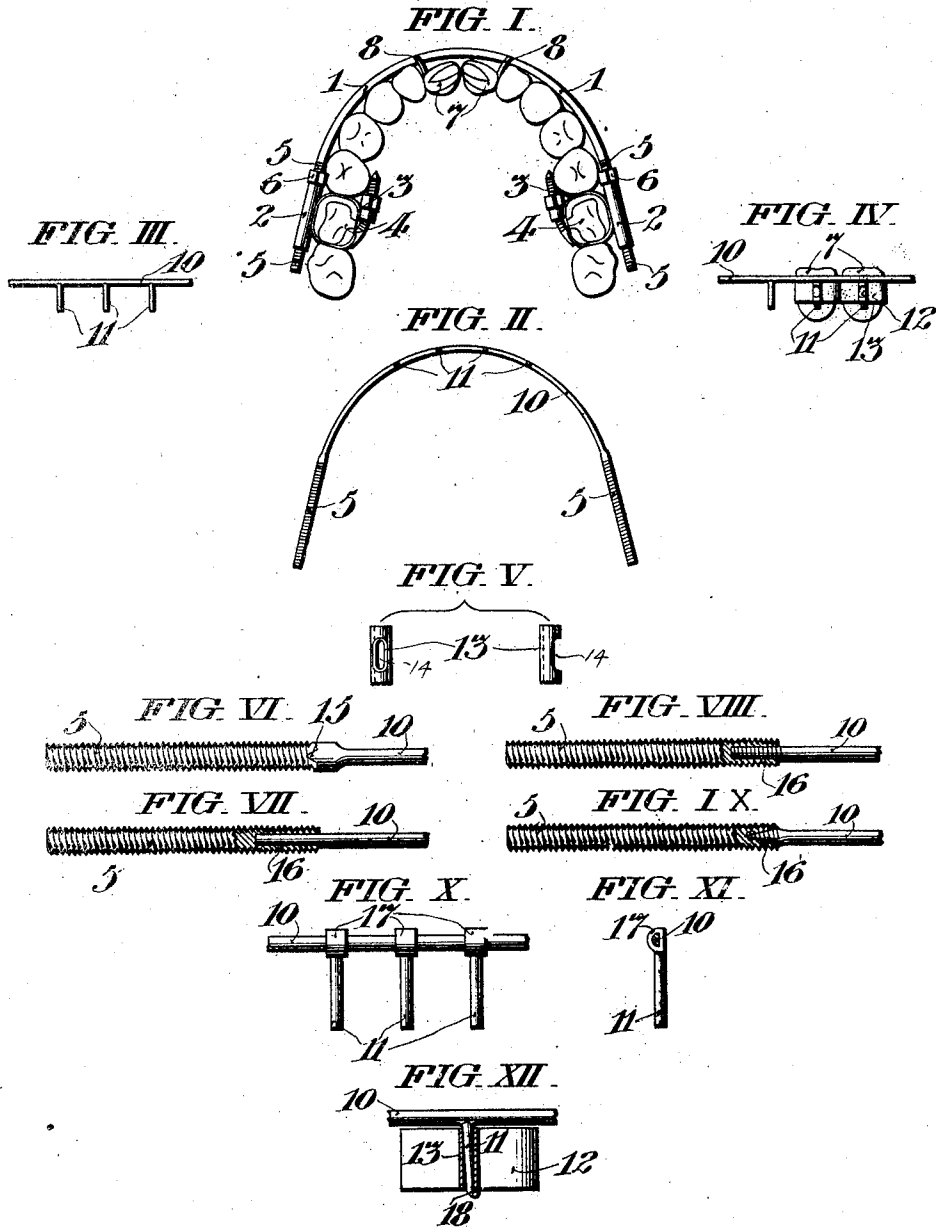


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 DENTAL TOOTH REGULATING AND RETAINING APPLIANCE.
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UNITED STATES PATENT OFFICE.

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DENTAL TOOTH REGULATING AND RETAINING APPLIANCE.

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To all whom it may concern:

Be it known that I, EDWARD H. ANGLE, a citizen of the United States, residing at New London, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Dental Tooth Regulating and Retaining Appliances; 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 improvements in orthodontia appliances or dental tooth regulating and retaining appliances of the class comprising anchor members, a delivery member in the form of an arch having extensible connection with said anchor members and adjusting nuts for projecting or distending said delivery member in respect to said anchor members.

Usually one appliance is employed for "regulating" or restoring malposed teeth to their proper position, and a separate appliance employed for "retaining" the teeth until they have become firmly established in their new position.

The object of my invention is to provide a combined regulating and retaining appliance, or an appliance by means of which the teeth may first be moved and then supported in their corrected relation with the line of occlusion, at the same time exerting a very gentle but constant force labially on the roots of the corrected teeth, thus greatly expediting the treatment of malocclusion either by shortening the period of retention or by reducing the number of visits from the patient to the orthodontists.

Another object of my invention is to render the regulating appliance more comfortable or rather less objectionable to the patient.

With these and other objects in view my invention consists of the appliances indicated in the accompanying drawings, described in the following specification and pointed out in the claims at the conclusion of said specification.

In said drawings Figure I is a plan view of a regulating appliance of the type to

which my improvements are applicable shown as mounted upon a human dental arch. Fig. II is a plan view of my improved retention arch-bar in its simplest form detached from the teeth. Fig. III is a front view of the middle portion thereof. Fig. IV is a similar view showing said arch connected to the teeth. Fig. V are enlarged views of the band tubes for receiving the spurs of the retention arch. Figs. VI, VII, VIII and IX are views in longitudinal section on an enlarged scale showing different forms of detachable connections between the middle segment and end sections of the arch bar. Fig. X is a front view on an enlarged scale of a portion of the retention arch showing adjustable spurs. Fig. XI is a sectional view thereof. Fig. XII is a sectional view of an interlocking connection between the spur and tube.

An appliance of the class to which my invention is applicable, as indicated in Fig. I, comprises a curved or bowed delivery member or arch-bar of approximately the same form as the human dental arch, to some of the teeth of which it is designed to be connected, and consisting of a middle segment 1 of strong elastic material, such as stiff spring wire, and externally threaded end sections 5, 5, in alinement with said middle segment and forming continuations thereof; anchor members consisting of tubes 2, 2, and bands 3, 3; and adjusting nuts 6, 6, working upon the threaded end sections of the arch bar and bearing against the ends of the respective anchor tubes 2.

The bands 3, 3, are designed to be securely attached to abutment or anchor teeth, such as the molars 4, 4, which are not to be moved, but which maintain the anchor tubes in fixed position. The middle segment 1 is securely attached to the malposed teeth, which in this instance are the incisors 7, 7, by ligatures 8, 8. The middle segment 1 of the arch-bar is of the same or nearly the same diameter as the threaded end sections 5 and is very stiff and capable of exerting considerable lateral or outward pressure when placed under tension.

By suitably manipulating the adjusting nuts 6, 6, the arch-bar may be projected and

distended relatively to the fixed anchor tubes. The nuts may be turned and the arch-bar projected until sufficient pressure has been brought to bear upon the malposed teeth and the appliance placed under sufficient tension for the time being. Repeated operations of this kind gradually restore said malposed teeth to their normal position in the dental arch, after which it becomes necessary to retain said teeth in their new position until firmly established therein.

The simplest form of my improved retention device as indicated in Figs. II, III and IV will now be described. Instead of the arch-bar of comparatively considerable strength and power which has been employed in accomplishing the movement of the teeth, there is substituted an arch-bar having the same length and curve, but the front segment 10 of which is a very delicate spring, such as iridio-platinum wire of relatively small diameter having little resiliency and capable of exerting but slight pressure. Projecting from said segment 10 are one or more very delicate straight spurs 11 also of spring material and extending directly in a line perpendicular to the plane of the arch. Bands 12 are fitted to the crowns of the incisor teeth 7, and to each band is secured a very small tube 13, said tubes being parallel with each other. The spurs 11 are of a size and so positioned as to enter the tubes 13, with the segment 10 resting upon the incisal ends of the tubes.

In applying the retention device the bands 12 are first applied to the teeth, the ends of the spurs gently inclined forward about three thirty-seconds of an inch by bending, and the arch then replaced upon the teeth, the spurs being sprung into the tubes. Thus a gentle force from the elasticity of the spurs and arch is given to the roots of the teeth in a labial direction, while the crowns are given stationary support in all directions.

By bending the spurs outwardly from time to time the force of the appliance may be renewed, and to do this without removing the arch-bar the tubes 13 are cut away at 14 as indicated in Fig. V. By pressing the arch-bar slightly downward, the ends of the spurs may be bent with a suitable instrument inserted through the cut away portion 14, and the spurs sprung back into position. Other advantages of my improved appliance will be apparent to those familiar with the art.

The delicate or light segment of the arch may also be used for regulating the teeth by bending it to conform very closely to the line followed by the labial surfaces of the incisors and bicuspid, the arch being connected to the teeth as before described. By gradually straightening the segment at suitable intervals a gentle and continuous regulating force may be applied to the teeth.

In this way an arch of exceedingly small diameter closely hugging the teeth may be used, instead of a comparatively stiff and larger diameter arch which necessarily stands out from the front teeth; the necessity of manipulating the nuts for applying tension to the arch is almost entirely dispensed with, and the number of visits from the patient greatly reduced.

It will be observed that while the middle segment of my improved arch-bar is exceedingly delicate,—being of very small diameter and possessing but slight resiliency—the externally threaded end sections are of much greater diameter and are many times stiffer than said middle segment. By this means I secure all the advantages of the delicate middle segment while affording the usual strong means for anchoring the arch and adjusting it through the instrumentality of the adjusting nuts.

While separate and distinct appliances may be employed for regulating and retaining, respectively, I have for convenience and economy provided a combined appliance. This combined appliance consists of the usual threaded end portions 5 of the arch-bar and the smooth or unthreaded middle portion or segment having detachable connection with said end portions. By this means the middle segment of the arch when first applied to the teeth is of the usual heavy spring wire having the capacity of exerting considerable pressure upon the malposed teeth, which are secured to the arch by means of ligatures 8. After the desired movement of the teeth has been accomplished, the arch is removed from the teeth and the delicate light spring middle section 10 provided with one or more spurs 11 substituted for the heavy regulating segment. The bands 12 having the tubes 13 are secured to the teeth in place of the ligatures, and the arch thus altered is now reapplied to the teeth in the manner before indicated.

The detachable connection between the middle segment and end pieces of the arch-bar may be of any desired form. Figs. VI, VII, VIII and IX indicate various detachable connections. In Fig. VI the pointed end 15 of the middle segment 10 enters a corresponding indentation in the end of the threaded portion 5, the two being united by solder. In Fig. VII the plain end of the middle segment is received within a plain socket 16 in the threaded portion 5 and the two united by solder. The connection indicated in Fig. VIII is the same as that of Fig. VII except that the end of the middle segment and the socket of the threaded portion are threaded. In Fig. IX the end of the middle segment is both pointed and threaded and screws into a coned threaded socket in the portion 5. The last two connections may be soldered or not, as pre-

ferred. By means of this detachable construction the same anchor bands and tubes and the same threaded end sections of the arch-bar, as well as the regulating nuts which have been employed for regulating the teeth, may also be employed as a retention device by the mere substitution of a retention segment for the regulating segment. In other words, the entire regulating appliance, with the exception of the middle segment of the arch-bar, is usable as a retention appliance. In this way the same adjustments or fittings for the one operation are used for the other operation, it being an exceedingly simple matter for the orthodontist to exchange the regulating segment for the retaining segment. Not only is much time saved by this means and the operation greatly expedited, but as a further advantage economy of appliances and parts of appliances is gained.

In the appliance indicated in Figs. II, III and IV the spurs 11 are shown as rigidly secured to the segment wire 10, as by solder. For convenience in mounting, these spurs may be adjustably or slidably secured to the segment. The segment instead of being round in cross-section has an angular cross-section which may be square or of any other desired form, such as half-round, as indicated in Figs. X and XI. The spurs 11 instead of being secured directly to the segment wire 10 are secured to rings or slides 17 corresponding in cross-section to that of the segment and adapted to snugly fit thereon. Thus, while the spurs are capable of being shifted along the arch segment as desired, they are incapable of being turned thereon, but are held firmly in a direction perpendicular to the plane of the arch.

It may be desirable or even necessary at times to provide some means for preventing accidental withdrawal of the spurs from the tubes other than the mere bending of the spurs as above indicated. A simple means of accomplishing this is indicated in Fig. XII. The spur 11 is bent to one side and formed on its extremity with a hook or shoulder 18 adapted to catch under the tube 13 and thus securely hold the spur in the tube. By forcing said hook toward the center of the tube the spur may readily be withdrawn therefrom.

I claim as my invention:

1. An arch-bar for dental tooth regulating appliances having a middle segment of spring material and externally threaded end sections, and a straight spur or spurs connected to said middle segment and extending directly in a line substantially perpendicular to the plane of said arch-bar.

2. An arch-bar for dental tooth regulating appliances having a middle segment of spring material and externally threaded end sections, and a straight spur or spurs con-

nected to said middle segment and extending directly in a line substantially perpendicular to the plane of said arch-bar, said spur or spurs also being of spring material.

3. An arch-bar for dental tooth regulating appliances consisting of a middle segment of spring material and externally threaded end sections having detachable connection with said middle section, said end sections being in alinement with said middle section and forming continuations thereof.

4. An arch-bar for dental tooth regulating and retaining appliances consisting of a smooth solid middle segment and externally threaded end sections in alinement with said middle segment and forming continuations thereof, said middle section being readily bendable and having but little resiliency and said end sections being stiff and of relatively greater diameter.

5. An arch-bar for dental tooth regulating appliances having a smooth middle segment of spring material, a slide mounted on said smooth middle segment, means for preventing said slide from turning thereon, a straight spur connected to said slide and extending directly in a line substantially perpendicular to the plane of said arch-bar.

6. An arch-bar for dental tooth regulating appliances having a smooth middle segment of angular cross-section, a ring having a corresponding cross-section and adapted to be adjusted along but not turn on said segment and a spur projecting from said ring in a direction substantially perpendicular to the plane of said arch-bar.

7. A dental tooth regulating appliance comprising anchor members designed to be fixedly attached to molar teeth in the human mouth, a delivery member consisting of an arch-bar having a middle segment of spring material with spurs projecting therefrom, bands adapted to be secured to teeth being restored to their normal or correct position, and tubes connected to said bands and adapted to receive the spurs projecting from said arch-bar.

8. A dental tooth regulating appliance comprising anchor members designed to be fixedly attached to the molar teeth in the human mouth, a delivery member consisting of an arch-bar having a middle segment of spring material with spurs projecting therefrom, bands adapted to be secured to teeth being restored to their normal or correct position, and tubes connected to said bands and adapted to receive the spurs projecting from said arch-bar, said tubes being cut away at a point between their opposite ends.

9. A dental tooth regulating appliance comprising an arch-bar of spring material, spurs projecting therefrom, bands adapted to be secured to teeth being restored to their normal or correct position, tubes connected

to said bands and adapted to receive the spurs projecting from said arch-bar, and an interlocking connection between said spurs and tubes.

5 10. A dental tooth regulating band having a tube extending in a direction from top to bottom and cut away at a point between its opposite ends.

In testimony whereof I have affixed my signature in the presence of two witnesses. 10

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Witnesses:

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