

[54] ORTHODONTIC PALATAL ARCH WIRES

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[51] Int. Cl. **A61c 7/00**

[58] Field of Search **32/14 A, 14 E**

[56] References Cited

UNITED STATES PATENTS

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[57]

ABSTRACT

A removable palatal arch wire is provided having a generally U-shaped, integral compressible loop portion formed intermediate its length adapted to function as a removable and adjustable spring whereby the force incorporated into said wire to reciprocally rotate, expand, contract, intrude, and/or torque the upper molars to which it is attached can be varied as desired merely by compressing or expanding said loop portion, depending upon the force required to shift said molars in order to provide sufficient space for the alignment of the adjacent anterior teeth by an orthodontist or dentist.

4 Claims, 8 Drawing Figures

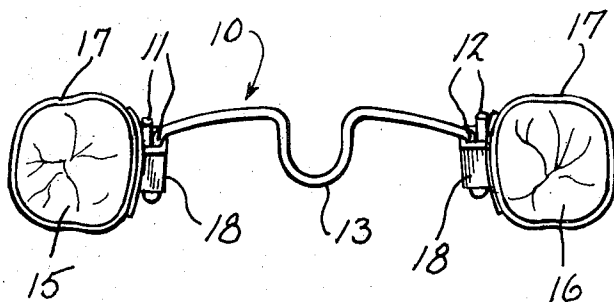


Fig. 1

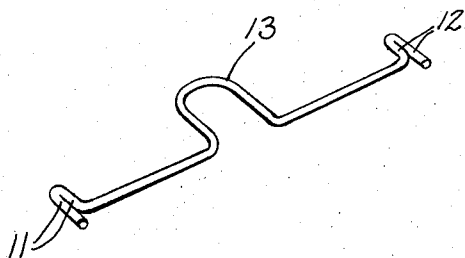


Fig. 2

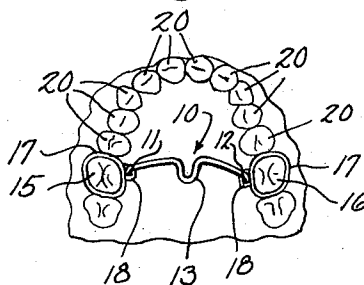


Fig. 3

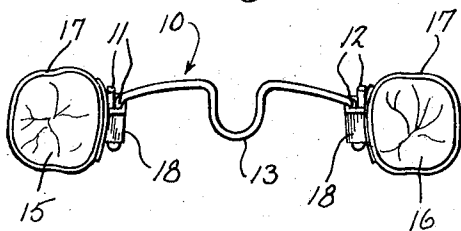


Fig. 4

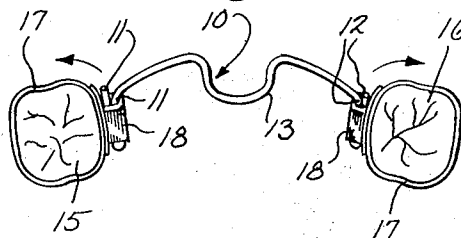


Fig. 5

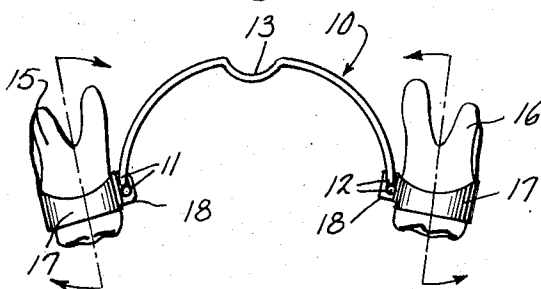


Fig. 6

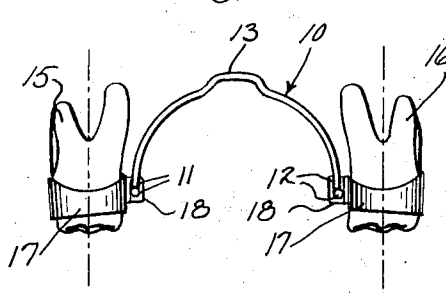


Fig. 7

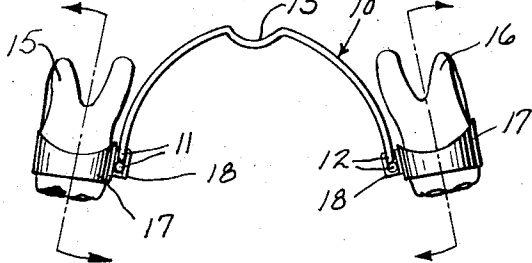
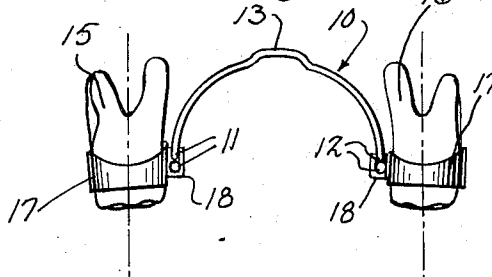


Fig. 8



ORTHODONTIC PALATAL ARCH WIRES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the field of orthodontic appliances, and more particularly to a new and improved removable and adjustable palatal arch wire for shifting upper molars.

2. Description of the Prior Art

In the straightening of teeth by an orthodontist the initial procedures frequently required (preferably within the first 6 months of treatment) are the expansion, rotation, and/or torquing of the patient's upper first molars which are misaligned or biased, in order to properly position said molars and thereby reduce crowding of the anterior teeth, thus making space for said anterior teeth to adjust to the proper occlusion and bite, and expediting the straightening of said teeth.

Heretofore the so-called face bows which are frequently used to straighten a patient's anterior teeth and correct jaw relationship have also been utilized to attempt to urge the patient's upper first molars distally, or toward the back, to make more space, but such face bows are not entirely satisfactory for the latter purpose because they frequently cause the molars to flare out, and they are not capable of rotating or torquing said molars into proper position. Moreover, with the use of a face bow it is not uncommon for said bow to pull downwardly or extrude the molars relative to the bony sockets, which is undesirable. Additionally, there is a minimal dimensional control because of the relationship of the round wire of the inner arch of said face bows and the round tube on the band which receives said round wire, which relationship permits said wire to twist freely in the receptacle tube.

Palatal arch wires or bars of the general type herein concerned have also been employed in the past in order to rotate, torque, or stabilize misaligned molars, but said prior arch wires have been soldered in place and are neither removable nor adjustable, which adjustability is essential to provide for the altered transpalatal dimensional changes. As a consequence, with said conventional palatal arch wires or bars the result is frequently that the molars are rotated or torqued too much, or too little, which then necessitates the tedious and time-consuming chore of repeating the entire fabricating procedure in an attempt to obtain the proper results. Of paramount importance is lack of adjustability in the area of the compression loop.

It is to overcome these shortcomings of conventional molar mechanics that the present invention has been designed, as will be hereinafter described.

SUMMARY OF THE INVENTION

As hereinabove mentioned, the principal purpose of the present invention is to provide a new, removable, adjustable, and improved palatal arch wire for rotating, expanding, contracting, intruding, and/or torquing a patient's upper first permanent molars in order to provide a mechanically improved relationship and contact with the molars of the opposing arch, as well as to increase the space to facilitate and improve the alignment and relationship of the remaining teeth. The new arch wire comprising the invention is readily removable from the patient's mouth and is characterized by an integral U-shaped compression loop portion intermediate

its length whose legs can be readily compressed or extended further apart by the orthodontist in order to incorporate lesser or greater reciprocal force, depending upon the requirements of the particular corrective treatment.

A further object of the invention is to provide an adjustable removable palatal arch wire which can be utilized to either reciprocally expand, rotate, contract, intrude, or torque a patient's upper first permanent molars, as described, and which arch wire can also be used to maintain the molars in proper position during the alignment of the anterior teeth by means of a face bow, conventional labial arch wires, bands or the like. In addition, the arch wire comprising the present invention also functions to eliminate the inadvertent extrusion of the molars during the alignment of the teeth. The arch wire affords control of the maxillary first permanent molars in all dimensions.

A further object of the invention is to provide a unique palatal arch wire which is adjustable in more than one dimension and can be employed to simultaneously and reciprocally rotate, expand, contract, intrude, and torque a patient's maxillary first permanent molars to the buccal.

A further object of the invention is to provide a novel palatal arch wire which can be used prior to the banding of the remaining teeth, thereby making space for the other teeth to move into proper occlusion and expediting the alignment procedures.

A further object is to provide a novel, removable palatal arch wire which allows the orthodontist to rotate molars of one side of the occlusion into proper relationship with the lower opposing member while expanding the other side if a crossbite occlusion exists.

A further object is to provide a novel removable palatal arch wire for the purposes described which wire is lightweight and not unduly uncomfortable for the wearer.

Still further objects of the present invention are to provide a new and improved adjustable palatal arch wire which is simple to insert and can be quickly and easily temporarily removed for adjustment, which improved arch wire produces positive results in substantially less time than prior, conventional molar mechanical devices, which improved arch wire is simple and relatively inexpensive to manufacture, and which novel improved removable palatal arch wire is otherwise particularly well adapted for its intended purposes.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, wherein there is illustrated one preferred embodiment of the invention, and wherein the same reference numerals designate the same or similar elements in all of the views:

FIG. 1 is an enlarged perspective view of the improved palatal arch wire comprising the invention;

FIG. 2 is an inferior plan view of a dental arch showing the arch wire inserted in position on the patient's upper first permanent molars;

FIG. 3 is an enlarged plan view illustrating the palatal arch wire mounted on a patient's upper first permanent molars prior to the adjustment and incorporation of force into said arch wire to rotate said molars;

FIG. 4 is a similar plan view showing the arch wire adjusted to rotate said molars in the direction indicated by the arrows;

FIG. 5 is a side elevational view of a patient's upper first permanent molars biased inwardly with the arch wire mounted thereon and adjusted to torque said upper first permanent molars to a more desirable position;

FIG. 6 is a side elevational view similar to FIG. 5 illustrating the upper first permanent molars after being uprighted and with the arch wire in a passive condition adapted to maintain the same in said position;

FIG. 7 is an elevational view similar to FIG. 5 but showing said upper first permanent molars biased outwardly with the arch wire mounted thereon and adjusted to torque said molars to a more desirable position; and

FIG. 8 is an elevational view of the upper first permanent molars illustrated in FIG. 7 after said molars have been uprighted, and with the arch wire in a passive condition adapted to maintain said molars in said position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to FIG. 1 of the drawings, illustrated therein is the novel and improved removable palatal arch wire comprising the present invention. Said arch wire is designated generally by the numeral 10 in the drawing and includes a first end 11 which is doubled over to form an inverted U-shaped outer end portion and an opposite end 12 which is similarly bent over upon itself. As will be observed, intermediate said ends 11, 12 the arch wire 10 is bent to provide an integral U-shaped projection 13 forming a compression loop including a pair of normally spaced, parallel leg elements.

Said arch wire is preferably formed of 0.036 inch diameter stainless steel wire, although other materials and diameter sizes could of course be utilized and the invention is by no means to be limited or confined in this respect. Said steel wire has an inherent spring-like resiliency, the importance of which quality will become apparent hereinafter. In the preferred form of the invention said arch wire is provided in a variety of lengths to fit each particular patient's dental arch as determined by the measurement in millimeters from molar to molar across the palate. For most purposes four different length wires as, for example, 34 mm, 37 mm, 41 mm, and 45 mm, will provide an adequate variety to accommodate the majority of patients. Again, however, the length of the wire is not a critical feature of the present invention, and the invention is by no means to be limited in this respect.

As appears in FIGS. 2-6, in the installation of the arch wire 10 on a patient's upper first permanent molars, which are designated 15, 16 in the drawings, a metal band or so-called sheath 17 is first fitted on and surrounding each of said molars, and in accordance with the present invention said sheath members are provided with lingually-projecting bracket elements 18 rigid thereon which are rectangular in cross section and adapted to receive the U-shaped end portions 11, 12 of said wire. In installing said wire ends 11, 12 the curved portions are projected into said bracket elements so that the entire end portions are fitted within said brackets and the spring-like quality of said arch wire causes said end portions to be firmly retained therein. Moreover with said wire end portions bent over upon themselves as shown and closely retained within said rectan-

gular brackets, there is minimal twisting of the wire end portions within said brackets 18, thereby promoting the torquing, expanding, and rotational action of said arch wire. When it is desired to remove the present wire, however, it is an easy matter to withdraw said end portions from their retaining brackets with relatively little manual force.

Referring now more particularly to FIGS. 2-4 of the drawings, when it is desired to rotate the upper first permanent molars 15, 16 to the buccal in order to make more space available for the anterior teeth 20 (FIG. 2), and to thereby permit the latter to assume their proper positions during the alignment procedures, the arch wire 10 is first fitted between said molars (FIG. 2), and the orthodontist will then either spread or compress the central U-shaped portion 13 of said wire to create force directed in the desired direction. If the upper first permanent molars are to be rotated in the direction indicated by the arrows in FIG. 4, for example, the orthodontist will open said intermediate U-shaped loop portion in order to exert a continuous rotational force on said molars in the direction shown, while if it is desired to rotate the molars in the opposite direction, the orthodontist merely squeezes or compresses said wire U-shaped loop portion in order to obtain an opposite rotational effect.

As will be appreciated, the degree of rotational force imparted to the molars is directly proportional to the extent to which the arch wire loop 13 is either opened or compressed, depending upon the orthodontist's analysis of the rotational requirements of the particular patient. From time to time during the course of the alignment of said upper first permanent molars, which ordinarily takes only a few months or less, it may be desirable to increase or lessen the rotational forces thereon, which can be quickly and easily accomplished merely by temporarily removing the arch wire 10 and adjusting the spread of said U-shaped loop portion 13 by means of a plier-like tool or the like until exactly the desired force is achieved. As hereinbefore mentioned, this force adjustment feature is an entirely new innovation in the art, and is an important advantage of the present invention.

In addition to the rotation of misaligned upper first permanent molars in order to position the upper first permanent molar with its shortest mesio-distal diameter in the dental arch and thereby eliminate the crowding of the more anterior teeth 20 (FIG. 2), and thus facilitate the alignment of said more anterior teeth, it frequently occurs that the molars are biased at an angle (FIGS. 5 and 7) and require torquing tension to straighten the same in order to provide sufficient space for the proper alignment of said more anterior teeth. The novel palatal arch wire comprising the present invention can also be advantageously utilized for this function.

As appears in FIG. 5, when the upper first permanent molars 15, 16 are biased inwardly from their proper position the sheath elements 17 can be mounted thereon and the flexible arch wire 10 installed therebetween in exactly the same manner hereinabove described with respect to the rotation of said upper first permanent molars, except that the intermediate U-shaped loop portion 13 of said wire is bent at a transverse angle relative to its normal plane by the orthodontist prior to the spreading or compressing of said loop to obtain the desired spring force.

As mentioned, if the roots of the upper first permanent molars are deflected outward into the buccal plate of bone as illustrated in FIG. 5, the open loop portion 13 of the arch wire is excessively open as shown, and in order to achieve an inward directed pulling force to upright the roots the open loop portion of wire is compressed and the doubled-over terminal ends are turned in such a manner that the superior member is moved inward and the inferior member outward. Conversely, if the roots of the upper first permanent molars are deflected inward into the palatal floor as illustrated in FIG. 7, and the crowns are directed outward, the open loop portion of the arch wire is opened more, as shown, and the doubled-over terminal ends are turned in such a manner that the superior member is moved outward and the inferior member inward, as illustrated in FIG. 8. As in the case of the rotation of said molars, it is usually necessary for the orthodontist to adjust the arch wire to increase or decrease the force delivered from time to time during treatment, depending upon the progress of the alignment procedures, and for this purpose it is merely necessary to temporarily remove the wire 10 and open or compress said loop portion as required.

One of the important features of the present invention, incidentally, and as hereinabove mentioned, is that said arch wire 10 can be utilized to rotate and torque a patient's molars simultaneously, which greatly expedites the correction. Moreover, the present invention allows the orthodontist to rotate the upper first permanent molar of one side to a proper relationship, where the occlusion is initially offset, while perhaps expanding the upper first permanent molar of the opposite side, if required.

Once the patient's upper first permanent molars 15, 16 have been rotated, expanded, contracted, intruded, and/or torqued into the proper aligned position, the palatal arch wire 10 can be removed merely by withdrawing the end portions 11, 12 thereof from the sheath brackets 18. However, it is advantageous to leave the wire in the patient's mouth in a passive condition for a sufficient period to allow the alveolar bone to stabilize around the roots of the aligned upper first permanent molars. Once this has been accomplished the relapse tendency is diminished. Said wire is frequently retained in the dental arch to stabilize the molars during the banding and aligning of the anterior teeth. While it has been mentioned herein that it ordinarily takes only a matter of weeks, or perhaps a few months, to rotate, expand, contract, intrude, or torque upper first permanent molars to their proper position, this is variable, of course, depending upon such factors as the age of the patient, the health of the patient, the anthropology of the patient, lip structure, bone structure, how much pressure is applied, and how far the upper first molars have to be shifted, etc.

A further important characteristic of the arch wire 10 featured in the present invention is that many times during the aligning of a patient's teeth with conventional face bows said appliances have a tendency to pull downwardly or extrude the molars, which is undesirable. With the present palatal arch wire mounted thereon, however, such extrusion of the molars is minimized, thereby further enhancing and facilitating the correction.

From the foregoing detailed description it will be seen that the new palatal arch wire device comprising

the present invention is an obvious improvement over the devices heretofore used, and is a definite advancement in the art.

Primarily, as described, the present invention is unique in that it is provided with an integral, U-shaped compression spring portion intermediate its length which can be quickly and easily adjusted in more than one dimension to obtain positive control of the force required to rotate, expand, contract, intrude, and/or torque a patient's upper first permanent molars in order to provide greater space for the alignment of the adjacent more anterior teeth. Moreover, the removability and adjustable nature of the present arch wire permits the orthodontist to make periodic adjustments in said torquing, expansion, contraction, intrusion, and/or rotational force as indicated by the progress of the individual patient.

Further advantageous features of the present invention are that it can be simply and quickly installed or removed from a patient's mouth, it produces positive results in less time than prior, conventional molar mechanical devices, and it is relatively inexpensive to manufacture.

It is to be understood, of course, that while one preferred embodiment of the present invention has been illustrated and described herein, various modified forms thereof may occur to those skilled in this art and what is intended to be covered herein, therefore, is not only the illustrated design of the present invention but also any and all variations or modifications thereof which come within the spirit of said invention.

I claim:

1. An orthodontic appliance for applying rotating, expanding, contracting, intruding, and/or torquing forces to a pair of opposed molars in the upper arch of a person comprising, brackets mounted on the lingual sides of the molars, each bracket having a rectangular in cross-section generally mesiodistally extending opening, a round wire of spring steel of a length substantially equal to the palatal distance between the brackets having an open U-shaped spring loop intermediate the terminal ends thereof, and said terminal ends being bent over double to form rectangularly shaped inserts to removably and frictionally fit in the bracket openings and preclude relative rotation therebetween, wherein the wire is arched in substantial conformity to the palate and the loop extends substantially concentric to the palate.

2. An orthodontic appliance as defined in claim 1, wherein said spring loop includes parallel opposed leg portions and an arcuate bight portion and bending of the bight portion controls the force output of the loop.

3. An orthodontic appliance as defined in claim 1, wherein the open end of said spring loop faces mesially.

4. An orthodontic appliance for applying rotating, expanding, contracting, intruding, and/or torquing forces to a pair of opposed molars in the upper arch of a person comprising means mounted on the lingual side of the molars, each said means having a non-circular in cross section generally mesiodistally extending opening, a round wire of spring steel of a length substantially equal to the palatal distance between the brackets having an open U-shaped spring loop intermediate the terminal ends thereof, non-circular inserts on said terminal ends shaped to removably and frictionally fit in the openings of said means and preclude relative rotation therebetween, wherein the wire is arched in substantial conformity to the palate and the loop extends substantially concentric to the palate.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,792,529

DATED : February 19, 1974

INVENTOR(S) : Robert A. Goshgarian

It is certified that error appears in the above—identified patent and that said Letters Patent is hereby corrected as shown below:

Col. 6, line 60, change "the brackets" to --said means--.

Signed and Sealed this

Twenty-second **Day of** *March* 1983

[SEAL]

Attest:

GERALD J. MOSSINGHOFF

Attesting Officer

Commissioner of Patents and Trademarks