United States Patent

Wallshein

[15] **3,683,502**

[45] **Aug. 15, 1972**

[54] ORTHODONTIC SYSTEMS

[72] Inventor: **Melvin Wallshein**, 8645 Bay Parkway, Brooklyn, N.Y. 11214

[22] Filed: **Sept. 14, 1970**

[21] Appl. No.: **72,070**

[52] **U.S. Cl.** ..... **32/14 A**

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

[58] **Field of Search** ..... 32/14 A

[56] **References Cited**

UNITED STATES PATENTS

382,897	5/1888	Patrick	32/14 A
3,597,845	8/1971	Russ	32/14 A
3,237,305	3/1966	Hegedus	32/14

FOREIGN PATENTS OR APPLICATIONS

579,603	8/1958	Italy	32/14 A

Primary Examiner—Robert Peshock
Attorney—Friedman & Goodman

[57] **ABSTRACT**

A rigid arch wire is fixed in position on bracket-holding tooth bands on selected teeth. Every tooth whose root is to be shifted, has one of such bands thereon, and the bracket associated therewith is rotatably mounted on the arch wire. Any tooth to be swung in, about its root tip as an axis, needs no band thereon. The arch wire serves as a scaffold to support pressure-exerting elements, each of which consists of a sleeve which snaps on and is provided with a securing means, as for instance, a set screw. Resilient fingers or various shapes, or adapted to be bent into various shapes, extend from the sleeve and are adjustably stressible. They are arranged to press on the teeth to be moved, their bands, or against a bracket part as need may require to accomplish the required tooth movement, and may also be made to serve in place of tie wires.

11 Claims, 16 Drawing Figures

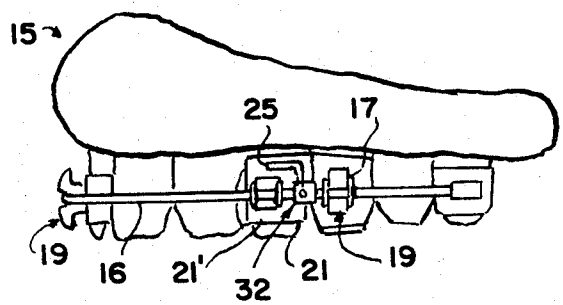


FIG.1

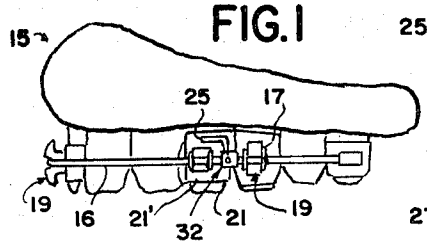


FIG.2

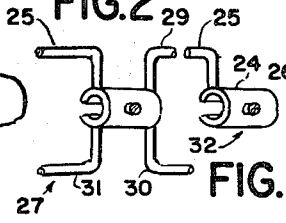


FIG.3

FIG.4

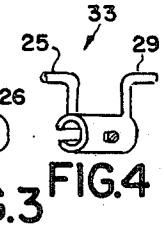


FIG.5

FIG.6

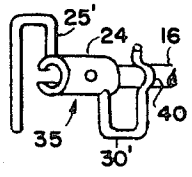


FIG.9

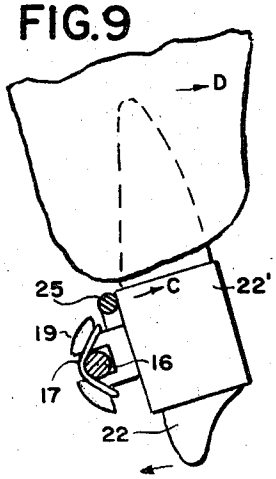


FIG.8

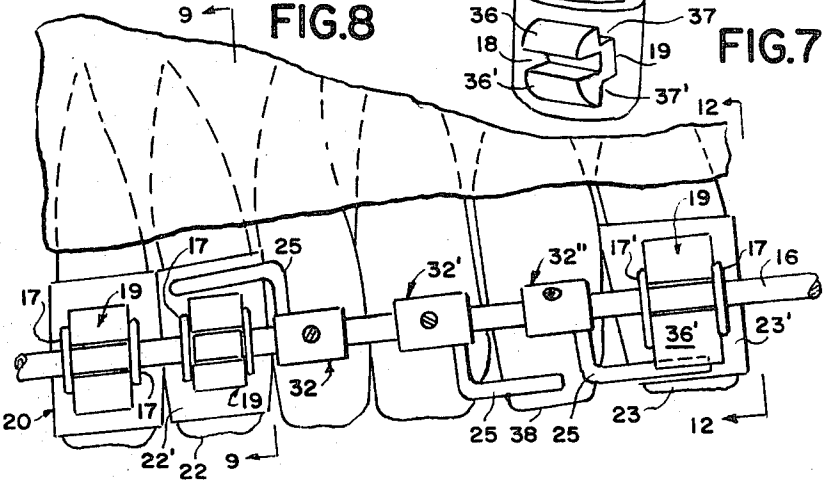


FIG.7

FIG.10

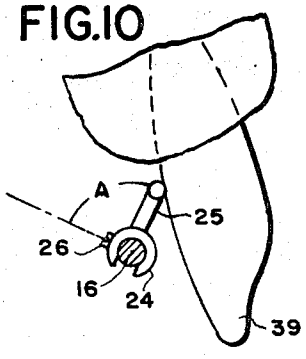


FIG.11

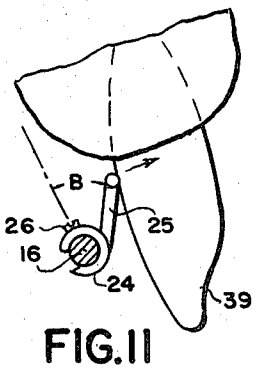


FIG.12

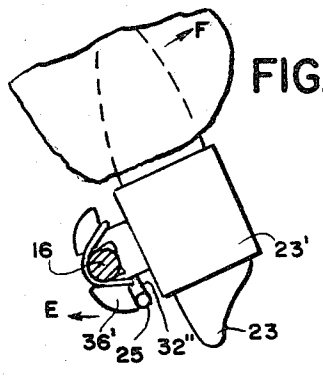


FIG.13

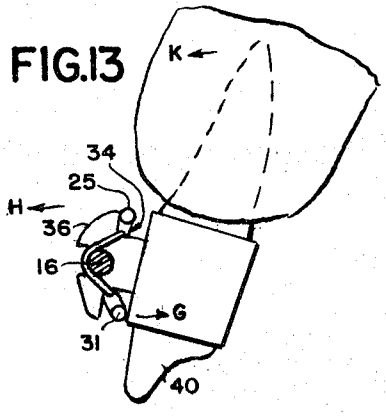


FIG.14

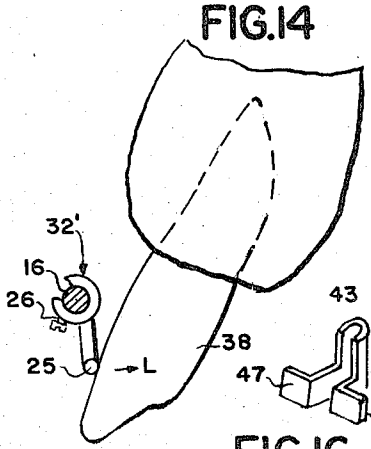
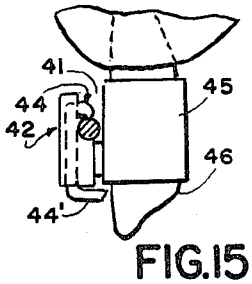


FIG.16

FIG.15



INVENTOR,
MELVIN WALLSHEIN,
BY

ATTORNEY.

ORTHODONTIC SYSTEMS

The present invention relates to, and its principal object is to provide, novel and improved orthodontic systems involving an arch wire, bracket-holding tooth bands and pressure-applying elements, arranged in novel functional relationships offering new modes of operation with positive adjustments and movements accomplishing planned results to attain proper correction. Also of prime importance of these systems is the accomplishment of tooth movement by shift of its root even appreciable distances.

A further object of this invention is to provide novel and improved orthodontic systems of the character described, involving fittings for associating with the teeth, which are simple in construction, easy to mount and bring into cooperation, and to afford adjustment of all acting forces indivdually, without affecting the action of the others, and which systems are of economical make-up, easy to install and manipulate, presenting no discomfort to the patient, and which are efficient in carrying out the purposes for which they are designed.

Other objects and advantages will become apparent as this disclosure proceeds.

In the practice of this invention, the arch wire is never called upon to exert any force against any tooth; the arch wire being of rigid material , mounted fixed in position in bracket-holding tooth bands on selected teeth. Every tooth whose root is to be shifted, has one of such bands thereon, and the bracket it presents is rotatably mounted on the arch wire. Any tooth to be swung in about its root tip as an axis, needs no band thereon, The arch wire serves as a scaffold to support pressure-exerting spring finger elements, each of which in the embodiments shown, consist of a split sleeve from which laterally extend at least one resilient cantilever spring which is bent as needed to press on a tooth, its band or against part of the bracket, and is adjustably stressible. Each sleeve has a set crew to secure it to the arch wire. These sleeves may be snapped onto the arch wire, slid thereon to required position, turned thereon a desired extent to stress their spring fingers, and then tighten them in position. The spring fingers usually are L-shaped and may impose their force against more than one tooth. The fingers on one sleeve may act against different teeth, or cumulatively against the same tooth. Said fingers may be of any length, bendable into various shapes, and as will be shown, when U-shaped, may be made to serve also in place of tie wires.

In the accompanying drawing forming part of this specification, similar characters of reference indicate corresponding parts in all the views.

FIG. 1 is a side view of upper teeth showing one practice of this invention.

FIG. 2 is an enlarged fragmentary perspective view of a force-exerting element structure whose bendable, resilient fingers may be of any length. Such element may be supplied as a stock part to an orthodontist who can remove any fingers thereof he does not need for a particular installation, and which he may bend and trim as required.

FIGS. 3, 4, and 5 are enlarged perspective views of similar-purpose elements, after different parts of the item of FIG. 2 are cut off, so what is left in each instance is what is particularly needed. Of course, these fittings can be offered as ready stock parts.

FIG. 6 is an enlarged perspective view of another force-exerting element structure of a construction formed of the stock part of FIG. 2, showing one finger fashioned to serve to engage and support the arch wire, in lieu of use of a tie wire.

FIG. 7 is an enlarged perspective view showing a tooth band carrying a bracket of the type convenient for use in the systems shown.

FIG. 8 is a fragmentary enlarged side view of upper teeth dealt with in different manners in accordance with this invention, particularly showing several aarrangements for the shifting of teeth in various ways.

FIG. 9 is a section taken at line 9—9 in FIG. 8, and particularly shows how a tooth is shifted about the arch wire as an axis, whereby the root of the tooth is moved towards the tongue.

FIG. 10 is an enlarged side view showing the force-exerting element in its initial position, mounted on the arch wire and set to the tooth a resilient finger thereof is to act on. Said finger is here in untensed condition and the sleeve is loose.

FIG. 11 is a view like FIG. 10, where the sleeve has been turned to flex its finger, and in such position, is secured by its set screw to the arch wire. FIG. 12 is a section taken at line 12—12 in FIG. 8, showing another way how a tooth is shifted about the arch wire as an axis, whereby its root is moved towards the tongue.

FIG. 13 is an enlarged fragmentary view showing one way how a tooth is shifted about the arch wire as an axis whereby its root is moved away from the tongue.

FIG. 14 is an enlarged fragmentary view showing how a tooth is moved by applying force against its crown to move the tooth towards the tongue about the tip of its root as an axis.

FIG. 15 is an enlarged side view of a tooth holding a band presenting a bracket of a modified construction, suitable in the practice of this invention, in place of the item shown in FIG. 7.

FIG. 16 is a perspective view of the bracket part included in the assembly shown in FIG. 15.

In the drawing, the numeral 15 designates generally the upper teeth of a mouth, equipped with a rigid arch wire 16 which is fixed in position by tie wires 17 which hold it tightly within the channel 18 of a bracket 19 presented on each band 20 which is on selected teeth not to be moved in this treatment. A similar bracket-presenting band is provided on each tooth which is to be rotated about the arch wire 16. These are indicated by the numerals 21', 22', and 23' which are on the teeth 21, 22, and 23 respectively. Here, the tie wires 17 are just sufficiently loose on the arch wire, to permit such rotation. The force-exerting elements shown in FIGS. 3-5, can be formed by the orthodontist from stock pieces of the construction shown in FIG. 2, by cutting off the L-shaped spring fingers not needed for the particular installation, or he may be furnished all the forms as stock pieces. These are of resilient material so the fingers can be flexed. Each such element comprises in the embodiments shown, a split sleeve 24, to engage a little more than 180° of the arch wire 16, and capable of being snapped thereon, whereupon they are turnable, so after the finger 25 is flexed from a mere contact relation with the tooth it is against, by changing the angle A to angle B, the element is fixed to the arch wire by means of its set screw 26. The smaller said

angle B is made, the greater is the force exerted by the finger against what it presses, and hence such pressure is adjustable. The spring fingers of the fitting **27**, are denoted respectively by the numerals **25**, **29**, **30**, and **31**, and such numerical designations are repeated where they occur in the fittings **32–34**. All spring fingers are cantilevers. The bracket form preferably used as shown in FIG. **7**, includes the wings **36**, **36'**, so as to make the channels **37**, **37'**.

In FIG. **8**, the fittings **32**, **32'** and **32''** are identical, yet each is arranged to accomplish a different result in the examples of use illustrated. The stressed spring finger **25** of the fitting **32**, presses against the upper part of the band **22'** which is on the tooth **22**, that requires as shown in FIG. **9**, to have its root moved in the direction D. This shift is accomplished because the force C exerted by said finger, causes the tooth to be urged clockwise about the arch wire **16** as an axis. The spring finger **25** of the fitting **32'**, acts as shown in FIG. **14**, against the lower portion of the tooth **38** in the direction L, thereby causing the tooth to be shifted inwardly towards the tongue about its root tip as an axis. The spring finger **25** of the fitting **32'** as shown in FIG. **12**, acts against the back face of the wing **36'** of the bracket on the band **23'** mounted on the tooth **23**, thereby exerting a force in the direction E, to turn the tooth clockwise about the arch wire **16** as an axis, and so its root is moved in the direction F. In FIG. **13**, the fitting **34** is arranged that its spring finger **25** acts against the wing **36** in the direction H, and its spring finger **31**, acts against the lower part of the band on the tooth **40**, in the direction G, such forces urging the tooth to be rotated counterwise about the arch wire **16** as an axis whereby it is straightened; the turning forces caused by the action of said spring fingers **25** and **31**, being cumulative. At frequent examinations to view the results, the orthodontist can adjust each of the elements and their spring fingers, to exert the required stress, by proper bending of the fingers with or without arcual shift of the sleeves on the arch wire.

It is evident that any of the fittings having a plurality of spring fingers can be used to act on two adjacent teeth, by bending the fingers so that one acts on the one tooth and the other on the tooth adjacent, or the second tooth from it. It is also evident that the fingers may be of different dimensions and lever shapes, which may include L-shapes as mentioned, V-shapes and U-shapes as shown in FIG. **6**, and the horizontal arm of a finger may be long enough and properly shaped to act against two teeth, their bands or bracket wings, all of which is believed to be readily understood without the need of further illustration. A special adaptation is shown in FIG. **6**, where the fitting **35** has one of its fingers bent into a U-shape as shown at **30'**; the distal end section which is across the axis of the sleeve **24**, being formed with a crimp **40** near distal end, which is adapted to straddle and press against the arch wire **16**, thus serving in lieu of a tie wire to aid holding said wire in place. The finger **25'** is for acting against a tooth, a bracket or band thereon, to effect a correction in tooth position, all of which the orthodontist will readily understand without further explanation.

It is intended that the arch wire shall be deemed rigid if it is stiff enough to avoid the force reactions thereon to cause any deformations therein. A recommended material therefor is stainless steel. The spring fingers of the sleeve fittings have been shown to be adapted to exert lateral push and pull forces on teeth. The recommended material therefor is also stainless steel.

Another form of bracket suitable for use in the systems illustrated herein, is that shown in FIG. **15**, for it is found to eliminate the need of tie wires, and offers the channel **41**, for the distal end of the spring fingers which are incident of the present invention. This bracket **42** is a piece shaped of strip material, to offer a bight channel **43** for a locking pin **44**. This bracket is welded onto the periphery of a metal band **45** which is tightly fitted onto a tooth **46** in usual manner; the numerals **47** denoting the welding fins. After the arch wire **16** is set into the channel **41**, the pin **44**, of L-form, is inserted in the bight channel **43**, and the end of the pin is bent over as at **44'**, to maintain the assembly.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the embodiments of the practices shown herein shall be deemed merely illustrative and not restrictive, and that the patent shall cover all patentable novelty herein set forth; reference being had to the following claims rather than to the specific showings and description herein, to indicate the scope of this invention.

I claim:

1. An orthodontic system comprising a rigid arch wire, at least two holding members adapted to be securely mounted onto selected teeth of one jaw, said holding members fixedly holding said arch wire in a stationary position relative to said holding members, force-exerting means disposed on said arch wire for exerting pressure on at least one other tooth of said one jaw to move said one other tooth in said one jaw, said force-exerting means being rotatably mounted on said arch wire to any one of a series of angular positions between one angular position to exert a relatively small pressure on said one other tooth and another angular position to exert a relatively large pressure on said one other tooth for adjusting said exerting pressure on said one other tooth, said force-exerting means including a sleeve disposed in rotatable engagement on said arch wire, said sleeve being provided with at least one resilient spring finger, a base portion of said finger being secured to said sleeve with a free portion of said finger extending outwardly from said sleeve to define a cantilever element, said base portion rotating with said sleeve to effect a desired pressure exerted by said cantilever element on said one other tooth, and securing means disposed on said sleeve for releasably securing said sleeve in a selected one of said series of angular positions to maintain said desired pressure on said one other tooth.

2. An orthodontic system according to claim **1**, wherein said sleeve is of resilient material and split lengthwise to allow said sleeve to be snapped onto said arch wire, said sleeve encircling more than half-way around said arch wire to permit sliding movement of said sleeve along said arch wire.

3. An orthodontic system according to claim **1**, wherein said securing means includes a set screw to fix said sleeve to said arch wire.

4. An orthodontic system according to claim 1, wherein said finger is L-shaped with one arm being spaced from said sleeve, said one arm extending in a direction along said arch wire.

5. An orthodontic system according to claim 4, including a band member to be securely mounted onto said one other tooth, a bracket fixed on said band member, said bracket being provided with a channel thereacross, said arch wire being positioned through said channel, means holding said arch wire in said channel with said bracket being rotatable on said arch wire, said one arm of said finger being in contact with one of said bracket, said bracket, said band member and said one other tooth at a place spaced from said arch wire.

6. An orthodontic system according to claim 5, wherein said bracket includes a wing portion spaced from said band member to define said channel, said wing portion being provided with a bight channel, said means holding said arch wire including a locking pin disposed in said bight channel to engage said arch wire.

7. An orthodontic system according to claim 1, wherein said sleeve is provided with two resilient spring fingers.

8. An orthodontic system according to claim 1, wherein said sleeve is provided with at least two resilient spring fingers, each of said two fingers being L-shaped with one arm of each finger being spaced from said sleeve, said one arms extending in opposite directions along said arch wire.

9. An orthodontic system according to claim 8, wherein one of said two fingers is disposed to one side of said arch wire, and the other of said two fingers is disposed to another side of said arch wire.

10. An orthodontic system according to claim 8, wherein said two fingers are disposed to one side of said arch wire.

11. An orthodontic system according to claim 1, wherein said sleeve is provided with at least two resilient spring fingers, each of said two fingers being L-shaped with one arm of each finger being spaced from said sleeve, said one arms extending in one direction along said arch wire, one of said two fingers being disposed to one side of said arch wire, and the other of said two fingers being disposed to another side of said arch wire.

12. An orthodontic system according to claim 1, wherein said sleeve is provided with first, second, third and fourth spring fingers, each of said spring fingers being L-shaped with one arm of each finger being spaced from said sleeve, said one arms of said first and second fingers extending in one direction along said arch wire, said one arms of said third and fourth fingers extending along said arch wire in an opposite direction of said one direction, said first and third fingers being disposed to one side of said arch wire, and said second and fourth fingers being disposed to another side of said arch wire.

13. An orthodontic system according to claim 1, wherein said spring finger is provided with a distal section spaced from said sleeve, said distal section being disposed transversely with respect to said sleeve.

14. An orthodontic system according to claim 13, wherein said distal section of said finger is provided with crimp means to straddle said arch wire for holding said arch wire in said stationary position relative to said holding members.

* * * * *