

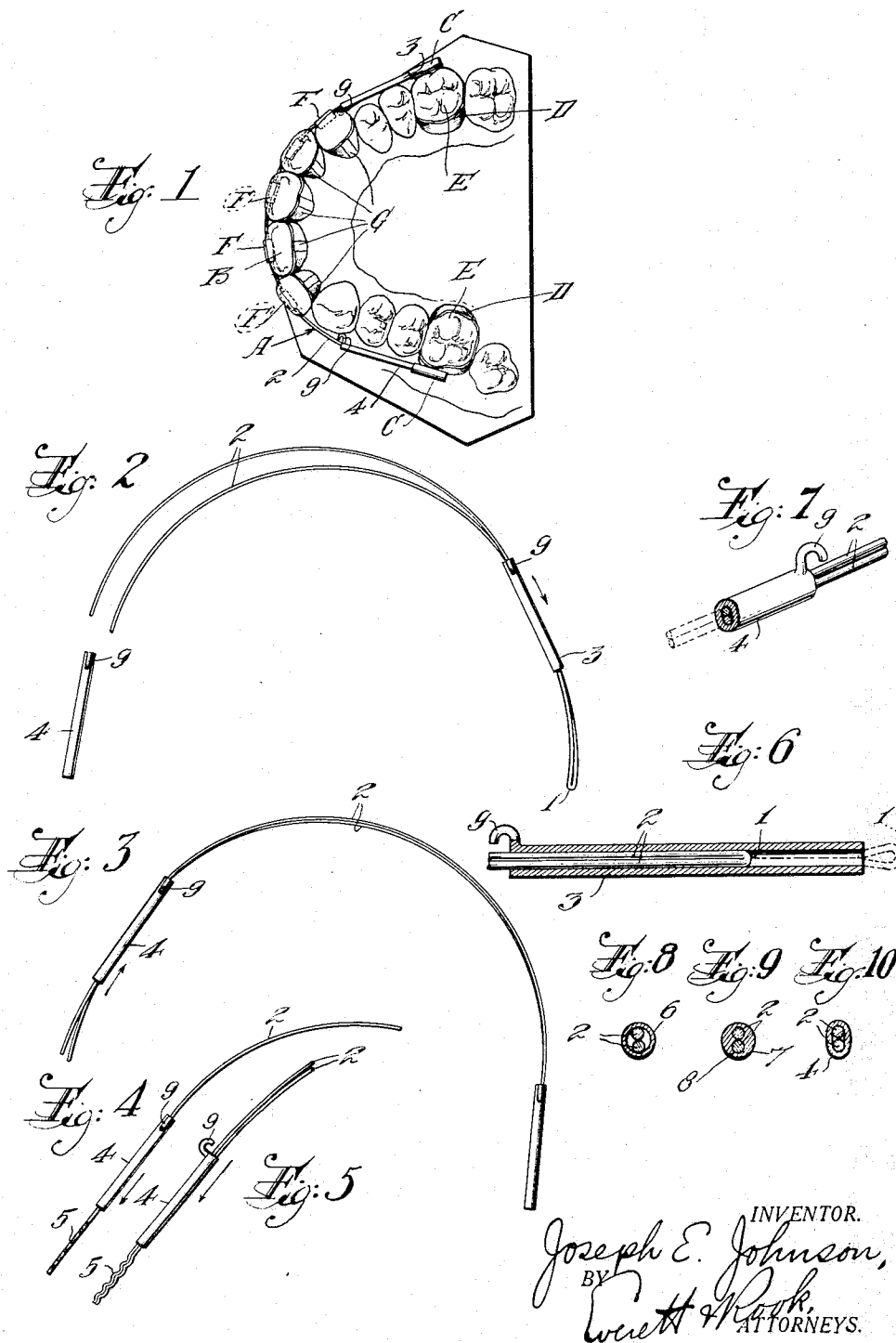
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ORTHODONTIA ARCH BOW

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ORTHODONTIA ARCH BOW

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6 Claims. (Cl. 32-19)

This invention relates to arch bows, arch bands or arch wires used in orthodontia appliances. An arch bow of this type usually comprises a single spring wire curved to conform approximately to the normal dental arch, the ends of the bow being anchored to suitable anchor teeth, such as molars, and the intermediate portions of the bow being connected to a tooth or to the teeth to be moved or regulated. In the use and operation of such appliances, the portion of the arch bow or arch wire adjacent a tooth to be treated is initially bent or sprung in one direction or another out of its normal shape in order to connect it to the tooth which is out of its normal position in the dental arch, and the resiliency of the wire, i.e., its tendency to return to its normal shape, exerts a pressure or tension on the tooth tending to move the tooth into its proper position.

My invention is directed toward increasing the efficiency of an arch bow both in its degree of resiliency, that is, the degree of its tendency to return to its normal shape after deformation or bending, and in the strength of the bow or the amount of force it is capable of exerting upon the tooth to move the latter; in other words, I contemplate an arch bow which shall be both highly resilient and sufficiently strong to complete the movement of the tooth or teeth to be treated uniformly and in a short time, for example, within a few months, instead of a period of years now usually required with known arch bows.

Also, an object of my invention is to provide such an arch bow which shall be capable of withstanding strains incident to mastication without deformation and shall resist breaking or fracture during the attachment thereof to the teeth and during the period of treatment.

A further object of my invention is to provide an arch bow that shall operate with as much ease and with as little pain or discomfort to the patient as possible, and whereby the orthodontia operation may be performed substantially automatically after the appliance has been initially adjusted to the teeth, without the necessity for frequent adjustments of the appliance by the orthodontist during the period of the regulation of the teeth.

Other objects of the invention are to provide an arch bow of this character which shall comprise a plurality of approximately parallel spring wires or wire strands, each wire being extremely small in diameter, for example .010 of an inch, and having great resiliency, and the plural wires

together providing great strength; to provide novel and improved means for securing terminal tubes upon the extremities of said wires or wire strands to cooperate with anchor tubes on the anchor teeth; to provide an arch bow which shall comprise a single length of highly resilient wire, extremely small in diameter, and returned or doubled upon itself with the portion of the wire adjacent the bend secured in one terminal tube and the ends of the wire secured in another tube; and to obtain other advantages and results as will appear from the following description.

Referring to the accompanying drawing, in which corresponding and like parts are designated throughout the several views by the same reference characters,

Figure 1 is a top plan view of an arch bow embodying my invention, mounted upon a model of a dental arch to illustrate the manner of using the arch bow;

Figures 2 and 3 are perspective views of the arch bow, showing two steps in the construction thereof;

Figure 4 is a top plan view of one end of the arch bow, showing the manner of attaching one of the terminal tubes thereto;

Figure 5 is a side elevation of the construction shown in Figure 4;

Figure 6 is an enlarged vertical longitudinal sectional view through the terminal tube at the other end of the arch bow;

Figure 7 is a fragmentary sectional perspective view of the terminal tube and end of the arch bow shown in Figure 6;

Figures 8 and 9 are transverse vertical sectional views through two different forms of terminal tubes; and

Figure 10 is a similar view of the form of terminal tube shown in Figure 6.

Specifically describing the illustrated embodiment of the invention, the arch bow A is shown as comprising a plurality of strands of spring wire of a small diameter, for example ten thousandths (.010) of an inch. These strands of wire may be separate, but preferably are formed of a single length of wire, as shown in Figure 2, by bending the wire at the middle point of its length, as indicated at 1, so as to double the wire upon itself and provide two strands 2. The wire is of a much smaller diameter than single strand arch bows commonly used, and has less strength but a greater degree of resiliency, while the two strands together provide adequate strength in the wire to serve the purpose for which an arch bow is used.

For connecting the arch bow to anchor teeth, terminal tubes 3 and 4 are secured to the respective ends of the arch bow. These tubes may be oval in cross-section, as shown in Figures 7 and 10, so as to snugly receive the two strands of the wire side by side, and one tube 3 is initially slipped over the loose ends of the strands 2 and pushed toward the bent portion 1 of the wire. The diameter of the bend in the wire is greater than the internal dimensions of the tube 3, as shown by dot and dash lines in Figure 6, so that by forcing the tube 3 over the bend, or by pulling the bent portion of the wire into the tube, as shown in Figure 6, the tube is frictionally secured upon the wire. Thereafter, the other tube 4, which may be identical in construction with the tube 3, is slipped upon the free ends of the strands 2, as shown in Figure 3 of the drawing, whereupon the ends of the strands are crimped or otherwise bent or deformed, as at 5, so that their over-all dimensions are greater than the interior dimensions of the tube, as clearly shown in Figures 4 and 5. Then the tube is forced outwardly toward the ends of the strands over the crimped or bent portions 5, or the bent portions are pulled into the tube, so that the tube is frictionally held upon the ends of the strands.

The strands 2 are preferably arranged in contacting and parallel relation, and are bent to conform to the shape of the dental arch represented by the model B. In use of the arch bow, the terminal tubes 3 and 4 are secured in any suitable manner to anchor tubes C attached to anchor bands D mounted on suitable anchor teeth, such as the molars E. The intermediate portions of the arch bow are connected to the teeth to be treated in any suitable manner, as by clamps or locks F, such as shown and described in my co-pending application Serial No. 553,705, filed July 29, 1931, which are in turn brazed or soldered to the usual bands G. Each terminal tube directly connects together the corresponding ends of all of said wire strands at one end of the arch bow and holds said ends against relative lateral movement.

If desired, the terminal tubes 3 and 4 may be substantially circular in cross-section instead of oval, as indicated at 6 in Figure 8, with the internal diameter of the tubes substantially equal to the sum of the diameters of the two strands of the wire.

Another form 7 of terminal tube is illustrated in Figure 9, and has two tangentially arranged openings 8, each of a diameter to snugly receive one strand 2 of the wire. This type of tube is stronger than the other two types, since the walls are heavier.

Instead of crimping or bending the ends of the wire strands, as indicated at 1 and 5, the ends of the wires may be secured in the tubes by first passing the ends of the wires through the tubes, then dipping the extremities of the wires into borax, then heating the tubes over a blow pipe until the borax is melted, and then drawing the extremities of the wires back into the tubes. The borax thereafter hardens and securely holds the tubes on the wire.

To adjust the tubes 3 and 4, secured on the arch bow as shown in the drawing, to vary the length of the bow, it is merely necessary to slide the tubes relatively to the ends of the bow against the frictional resistance, while to adjust the tubes when they are secured on the bow by borax, as above described, it is merely neces-

sary to heat the tubes so as to melt the borax and permit relative sliding of the tubes and wire, after which the borax may be cooled so as to again secure the tubes on the wire.

Preferably the terminal tubes 3 and 4 are provided with intermaxillary hooks 9 to receive the intermaxillary rubber.

I have found that an arch bow constructed in accordance with my invention has a high degree of resiliency which causes it to tend to spring back to its original shape after it has been bent or deformed for connection to a tooth to be treated, and that the bow also has adequate strength to bodily move the teeth to be treated substantially automatically, with ease, and within a relatively short period of time, for example a period of a few months instead of a period of years which is required for satisfactory operation of known single wire orthodontia appliances of this type. Furthermore, my arch bow has, in addition to its high degree of resiliency, sufficient strength to resist bending or deformation by the strains incident to mastication, and to resist breakage or bending at the points where the intermaxillary rubber is attached to the hooks on the tubes.

Therefore, it is possible to separate the plurality of wires so that a portion of one wire may be attached to a tooth at one point and a portion of another wire may be attached to the same tooth at another point to effect a tilting action of the tooth; or a portion of one wire may be utilized for exerting a slight tension or pressure upon a tooth which must be moved at right angles to the plane of the dental arch, a portion of another wire may be used to simultaneously move the same tooth in the plane of the arch, and other portions of the two wires jointly may be utilized for moving other teeth under greater pressure in a plane of the arch. Light tension or pressure may be exerted upon certain teeth in any direction by a use of the portion of one of the wires, while greater tension or pressure may be exerted upon other teeth at the same time in the same or other directions with all of the wires. The arch bow is therefore susceptible of use for performing a wide variety of operations and yet is small, compact and can be easily manipulated.

While I have shown my invention as embodied in certain details of construction, it should be understood that this is primarily for the purpose of illustrating the principles of the invention, and that the details of construction of the arch bow may be modified and changed by those skilled in the art without departing from the spirit or scope of the invention as defined by the appended claims when construed in the light of the prior art.

Having thus described the invention, what I claim is:

1. An orthodontia arch bow comprising a plurality of approximately parallel spring wire strands and means directly connecting together and holding against relative lateral movement the corresponding ends of all of said strands at each end of the arch bow, the portions of said strands between their ends being attachable to teeth individually or together, whereby pressure or tension caused by the inherent resiliency of said strands separately or together can be applied to said teeth.

2. An orthodontia arch bow, comprising a piece of spring wire doubled upon itself, and terminal tubes one secured to the bent portion of

said wire and the other to the ends of the wire.

3. An orthodontia arch bow, comprising a plurality of strands of spring wire corresponding ends of all of which are crimped, and terminal

5 tubes having internal diameters to snugly receive the uncrimped portions of all of said strands and which have been forced into telescoping frictional engagement with said crimped portions, whereby said tubes are frictionally secured on said wires.

10 4. In an orthodontia appliance the combination with anchorages to be applied to a dental arch, of an arch bow comprising a plurality of approximately parallel spring wire strands
15 which together have the maximum strength required in the arch bow and greater resiliency than a single wire of the same strength and each of which alone has less than said required maximum strength, and terminal means at each
20 end of the arch bow directly connected to and directly connecting together in close relation against relative lateral movement the corresponding ends of all of said wire strands, each
25 of said terminal means being connected to one of said anchorages to positively hold said ends of said wire strands against lateral movement relatively to said anchorages and enabling manipulation of both of said wire strands relatively
30 to said anchorages simultaneously and together, the portions of said wire strands between said terminal means being attachable to teeth separately or together, whereby different degrees of tension or pressure caused by the inherent re-

siliency of the strands can be exerted selectively on different teeth by different portions of the arch bow.

5. An orthodontia arch bow comprising a plurality of approximately parallel spring wire
80 strands which together have the maximum strength required in the arch bow and greater resiliency than a single wire of the same strength and each of which alone has less than
85 said required maximum strength, and a terminal tube at each end of the arch bow telescopically mounted on and connecting together the corresponding ends of all of said strands against
90 relative lateral movement, said terminal tubes to cooperate with anchorages for connecting the arch bow thereto and enabling manipulation of said wire strands and tubes relative to said anchorages simultaneously and together, the portions
95 of said wire strands between said terminal tubes being attachable to teeth separately or together, whereby different degrees of tension or pressure caused by the inherent resiliency of strands can be exerted selectively on different teeth by different portions of the arch bow.

6. An orthodontia arch bow, comprising two
100 approximately parallel strands of spring wire each approximately ten thousandths of an inch in diameter, and a terminal tube snugly telescopically fitted over the ends of both of said
105 strands at each end of the arch bow to cooperate with an anchorage for anchoring said arch bow on a dental arch.

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