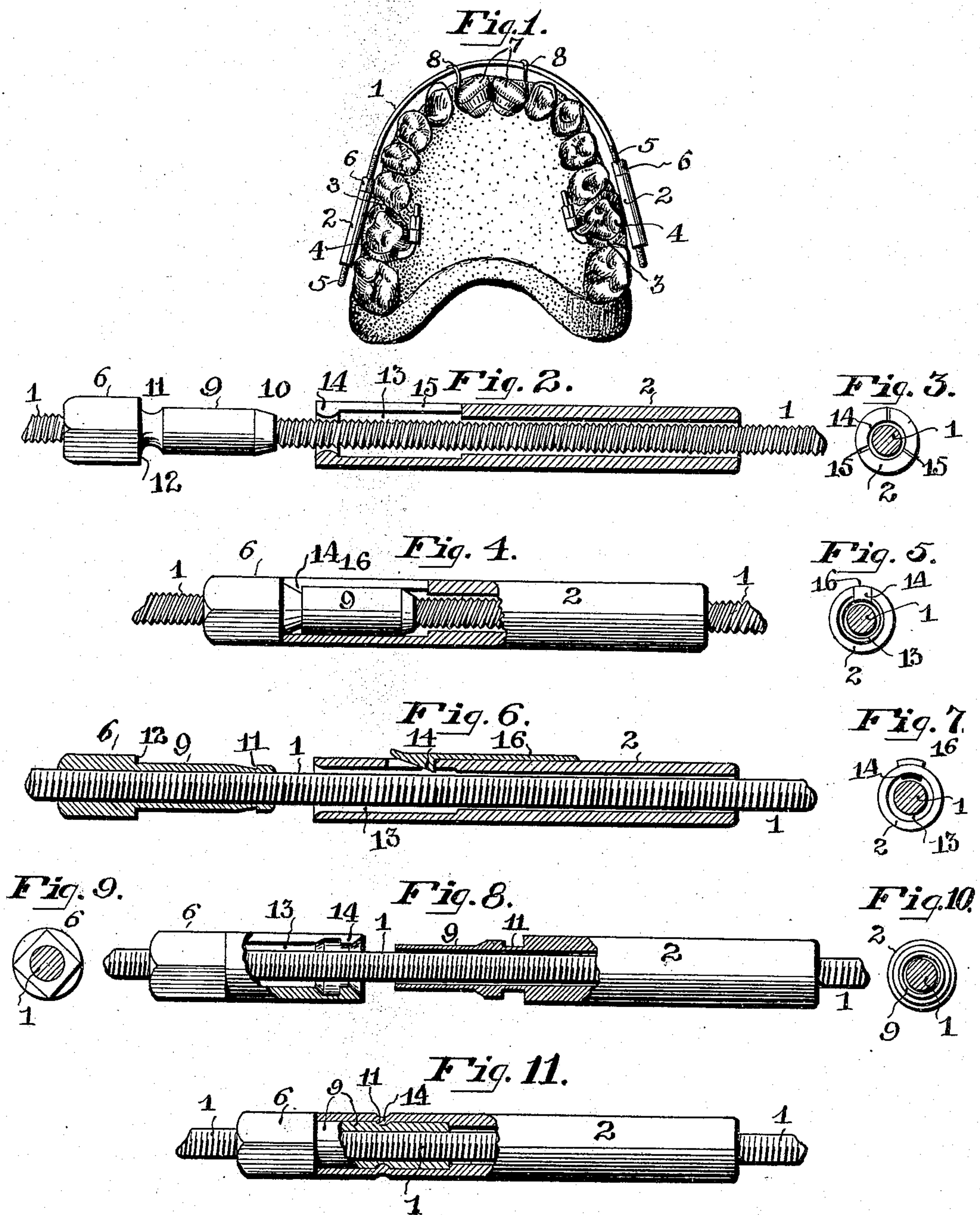


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DENTAL TOOTH REGULATING APPLIANCE.
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DENTAL TOOTH-REGULATING APPLIANCE.

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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 Larchmont, in the county of Westchester and State of New York, have invented a certain new and useful Improvement in Dental Tooth-Regulating 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 an improvement in dental teeth regulating or orthodontia appliances of the class comprising an anchor member, an extensible delivery member and an adjusting nut for projecting or distending said delivery member in respect to said anchor member. Appliances of this class when properly mounted upon teeth in the mouth may, by suitable manipulation of the adjusting nuts, be placed under tension and pressure thereby applied to malposed or irregular teeth for the purpose of restoring them to their normal position in the dental arch.

It is the object of my invention to provide improved means for preventing the adjusting nuts of such appliances from being accidentally turned or backed away from the anchor member; the improvement in its various forms or embodiments being indicated in the accompanying drawings, described in the following specification and pointed out in the claims at the conclusion thereof.

In said drawings:—Figure 1 is a plan view of a dental arch indicating an arch bar type of tooth regulator applied thereto. Fig. 2 is a view partly in longitudinal section and partly in side elevation, on a greatly enlarged scale, of a portion of a tooth regulator indicating one form of my improvement; and Fig. 3 is an end view of the anchor member of said appliance. Fig. 4 is a view similar to Fig. 2 of another form of my improvement; and Fig. 5 is an end view of the anchor member thereof. Fig. 6 is a longitudinal sectional view indicating another form of my improvement; and Fig. 7 is an end view of the anchor member thereof. Fig. 8 is a view partly in longitudinal section and partly in elevation of still another form of my improvement; Fig. 9 is an end view of the nut; and Fig. 10 an end view of the an-

chor member. Fig. 11 is a similar view showing even another form of my improvement.

Teeth regulating appliances of the class to which my present invention is applicable are of two types, *i. e.*—the arch bar type and the straight or “jack screw” type. An appliance of the first named type is indicated in Fig. 1 and consists of a curved or bowed arch bar 1, usually made of spring material, and so called because it is of approximately the same form as the human dental arch, to some of the teeth of which it is designed to be connected; and a pair of anchor tubes 2, 2, each of which has secured to it an anchor band 3. 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 limbs of the arch bar 1 are threaded for some distance from their ends, as at 5, the threaded portions being adapted to pass freely through the smooth or unthreaded bores of the respective anchor tubes. Upon each limb of the arch bar is an adjusting nut 6 working on the threads of said bar and adapted to bear against one end of the respective anchor tubes.

When the parts are in position as shown in Fig. 1 with the nuts bearing against the ends of the anchor tubes, the arch bar may be distended or projected relatively to the fixed anchor tubes by turning the nuts in the proper direction. The nuts may be turned continuously and the arch bar projected until external pressure is opposed to said arch bar sufficient to prevent it from moving farther. Malposed or irregular teeth, such as the incisors indicated at 7, 7, may be gradually restored to their normal position in the dental arch by means of this appliance by securely attaching said teeth to the arch bar, as by ligatures 8, 8, and gradually distending or projecting said arch bar by manipulation of the adjusting nuts 6, 6, in the manner above indicated.

Because of the relation of the parts of the device it is proper to designate the immovable or relatively fixed anchor tubes 2, 2, as the anchor member and the extensible arch bar 1 as the delivery member.

The straight or “jack screw” type of regulator differs from the arch bar type in that

the delivery member is straight instead of being bowed or arched and the anchor member is composed of but a single anchor tube and band, or other form of tooth attachment.

- 5 The arch bar type may properly be called a double jack screw because it has two anchor tubes and two adjusting nuts.

It is well known to orthodontists and others familiar with orthodontia or the art of
10 tooth regulation, that a malposed or irregularly positioned tooth is not restored to its normal or proper position in the dental arch by a single treatment; but that numerous treatments extending over a period of weeks
15 and even months are usually required. At each treatment the appliance is readjusted, the delivery member being moved just a little farther away from the anchor member each time, so that the tooth is moved very
20 slowly and gradually. It is also well known in the art that after each adjustment of the appliance by means of the adjusting nuts, when the appliance and teeth are placed under tension, this tension gradually diminishes as the tooth yields, and if the appliance
25 is not promptly readjusted and more tension applied, the tooth may yield to an extent that practically takes all tension off the appliance. While the device is under tension
30 there is more or less end thrust against the adjusting nut or nuts which are thereby prevented from accidental turning, but when the device is not under tension the nut or nuts is relieved of end thrust and may be freely
35 turned. Thus, after the tooth has yielded and the appliance is practically under no tension, there is no end thrust upon the nuts and under these circumstances the nuts may be readily backed away from the anchor
40 member by the tongue or cheek of the patient until the adjustment of the appliance is seriously disarranged. To prevent this accidental turning or backing away of the nuts and the consequent disarrangement of the
45 appliance, friction devices have already been provided. Such devices consist either of a cylindrical friction sleeve on the nut entering a cylindrical socket in the anchor tube, or a conical sleeve on said nut entering a conical
50 socket in said tube.

The means I employ in my present invention for preventing the adjusting nuts from being accidentally turned or backed away from the anchor member consists of a connection
55 between the nut and anchor tube that will permit of the nut being turned for the purpose of projecting the delivery member relatively to the anchor member, but which will prevent said nut from being accidentally turned or backed away from said
60 anchor member. This connection may be termed a "swivel," by which is meant a connection between the nut and anchor tube which permits of the former being turned
65 relatively to the latter, while the appliance is

being placed under tension, but which permits of no endwise movement between said nut and tube, except in some cases by the application of a force greater than that used in regulating the teeth. Broadly speaking,
70 this swivel connection between the nut and tube is formed by an annular groove in one and a lug on the other, adapted to engage said annular groove.

In Figs. 2 and 3 is illustrated a form of
75 connection in which the adjusting nut 6 is formed with a sleeve or extension 9 having a pointed or coned end 10 and an annular groove 11, said nut also being formed with a
80 shoulder 12. The sleeve or extension 9, the shape of which forms no part of my present invention, but which has telescopic connection with the anchor tube, may be a cylindrical friction sleeve, such as is shown in
85 Letters Patent No. 626,476, granted to me June 6, 1899; it may be a conical friction sleeve, or it may be a mere stud or extension of the nut without capacity of affording friction other than that provided by the swivel
90 connection, as will be hereinafter explained. The anchor tube 2 is formed with a socket 13 adapted to receive the sleeve 9 of the adjusting
95 nut, and is also formed with an annular lug 14 adapted to engage the groove 11 when the sleeve 9 is entered into the socket 13. For the purpose of forcibly connecting and
100 disconnecting the nut to and from the anchor tube, the latter may be split at one or more points, as indicated at 15. By making the lug and groove rounded as shown in Fig. 2,
105 the nut may be engaged with and disengaged from the anchor tube by forcibly pushing it in and pulling it out, but by making one side of the lug and corresponding side of the groove abrupt, as indicated in Fig. 4, the nut
110 may be interlocked with the anchor tube by forcibly pushing it in, but can only be disengaged therefrom by positively releasing the lug. The nut in this case may be released
115 by lifting the lug with the finger nail or a suitable implement. The lug may be annular, as indicated in Figs. 2 and 3, or it may be located on what is equivalent to a spring
120 tongue 16 cut in the anchor tube, as indicated in Figs. 4 and 5. Instead of making this spring tongue integral with the anchor
125 tube, it may be a separate piece of spring metal secured, as by soldering, to the exterior of the anchor tube with its lug projecting through an opening in said tube. Such a
130 construction is indicated in Figs. 6 and 7.

In Figs. 2, 3, 4 and 5 the annular groove 11 is near the shoulder 12 of the nut and the
135 lug 14 is at or near the outer end of the anchor tube. In Figs. 6 and 7 the groove is located near the end of the sleeve 9 of the nut and the lug is situated at or near the bottom of the socket 13 of the anchor tube. Still another modification is shown in Figs.
8, 9 and 10. Here the groove 11 and the

sleeve 9 is formed in the anchor tube, while the lug 14 and socket are formed on and in the adjusting nut.

All of the various forms of the connection 5 above described provide for forcibly connecting and disconnecting the nut and anchor tube and may therefore be termed detachable swivel connections. The lugs carried by the spring tongues, by the split anchor 10 tube, or by the split tubular nut extension, and which are adapted to be sprung into and out of engagement with the annular groove, may each be termed a spring detent.

In Fig. 11 is shown a simple form of 15 swivel connection in which no provision is made for disconnecting the nut from the anchor tube. An annular groove 11 is formed in the nut sleeve 9 and the lug 14 which engages said groove is formed by spinning the 20 metal of which the anchor tube is made into said annular groove. An appliance having this non-detachable form of nut connection can only be mounted upon the teeth while the appliance is assembled, whereas in appli- 25 ances having the detachable nut connection, the anchor tubes may be separately secured to the teeth, after which the delivery member with the adjusting nut or nuts thereon may be passed through the anchor tube or 30 tubes, the malposed tooth or teeth ligated thereto; and the adjusting nut or nuts forced into engagement with the anchor tube or tubes.

In the practical application of an appli- 35 ance having my improved nut connection (assuming it to be of the arch bar type), the appliance is first mounted upon the teeth, either assembled or by separately fastening the anchor tubes to the anchor or abutment 40 teeth and subsequently inserting the delivery member into said anchor tubes and ligating the malposed teeth to said delivery member. The adjusting nuts, if not already connected, are next forcibly engaged with the anchor 45 tubes and manipulated by means of a suitable wrench to project or distend the delivery member until the appliance and the malposed teeth are under proper tension. It will be understood that this is accomplished 50 by forcibly turning each nut with its shoulder 12 abutting against the end of the anchor tube and receiving the end thrust thereof. Since the anchor tubes are immovably fixed and since the nuts turn on the threads 55 of the arch bar, the effect will be to force the arch bar away from the anchor tubes, or to project or distend it in respect to said tubes. So long as the appliance is under tension the end thrust against the shoulder of the nut 60 will be sufficient to prevent the nut from being accidentally turned or backed away from the anchor tube, as previously explained; but when the device is not under tension, which takes place after the malposed teeth 65 have yielded sufficiently, the nut may be

accidentally turned or backed away unless some means are provided for preventing it. When my improved appliance is thus relieved of tension, the nut cannot turn in the reverse direction without moving the nut 70 endwise in a direction away from the anchor tube, owing to the threaded connection between the nut and arch bar, and as the nut has practically no endwise movement relative to the anchor tube and as the anchor 75 tube is immovably fixed, the effect of the reverse turning of the nut will be to force one side of the annular groove of the swivel connection against one side of the lug of said connection. The greater the force applied 80 to turn the nut in the reverse direction, the greater will be the friction between the parts of the swivel connection, the effect of which will be to offer resistance to the backward 85 turning of the nut. This resistance will be ample to prevent all accidental turning or backing away of the nut without in the least interfering with the forward turning of the nut for adjusting or applying tension to the 90 appliance.

I claim as my invention:

1. A dental tooth regulating appliance comprising a tubular anchor member designed to be held in a fixed position relative to the other parts of the appliance, a threaded delivery member adapted to freely pass 95 through said tubular anchor member, an adjusting nut working upon said threaded delivery member and adapted to bear against the end of said anchor member and a swivel 100 connection between said adjusting nut and said anchor member.
2. A dental tooth regulating appliance comprising a tubular anchor member designed to be held in a fixed position relative 105 to the other parts of the appliance, a threaded delivery member adapted to freely pass through said tubular anchor member, an adjusting nut working upon said threaded delivery member and adapted to bear against 110 the end of said anchor member and a detachable swivel connection between said adjusting nut and said anchor member.
3. A dental tooth regulating appliance comprising a tubular anchor member designed to be held in a fixed position relative 115 to the other parts of the appliance, a threaded delivery member adapted to freely pass through said tubular anchor member, an adjusting nut working upon said threaded delivery member and adapted to bear against 120 the end of said anchor member, an extension on said nut having telescopic connection with said tubular anchor member, an annular groove on one of said parts and a lug on the 125 other of said parts adapted to engage said annular groove, said annular groove and lug forming a swivel connection between said nut and anchor member.
4. A dental tooth regulating appliance 130

comprising a tubular anchor member de-
signed to be held in a fixed position rela-
tive to the other parts of the appliance, a
threaded delivery member adapted to freely
5 pass through said tubular anchor member,
an adjusting nut working upon said threaded
delivery member and adapted to bear against
the end of said anchor member, an extension
on said nut having telescopic connection with
10 said tubular anchor member, an annular
groove on one of said parts, and a spring de-

tent on the other of said parts adapted to
engage said annular groove, said annular
groove and spring detent forming a detach-
able swivel connection between said nut and 15
anchor member.

In testimony whereof I affix my signature
in presence of two witnesses.

EDWARD H. ANGLE.

Witnesses:

CHAS. H. HEANIS,
CARL F. PROBST.