

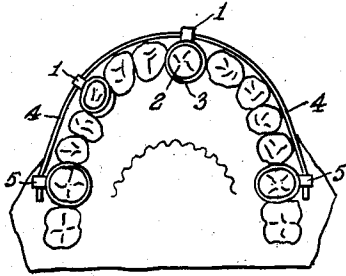
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H. J. RUSSELL ET AL  
ORTHODONTIC APPLIANCE

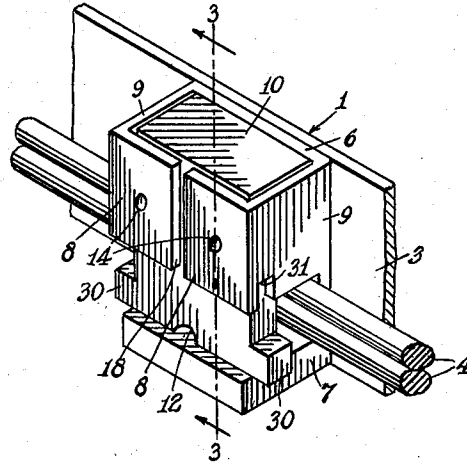
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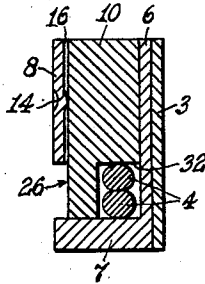
*Fig. 1.*



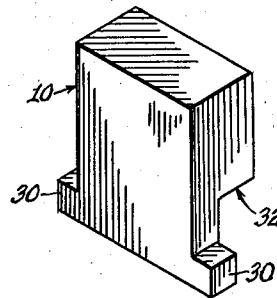
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



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## ORTHODONTIC APPLIANCE

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15 Claims. (Cl. 32-14)

**1**  
This invention is directed to the orthodontic appliance art and is more specifically directed to a lock device for attaching an arch bow to the teeth for the correction of irregularities in the tooth formation on the dental arch.

An arch bow usually comprises a spring wire curved to conform approximately to the normal dental arch, the ends of the wires being anchored and the intermediate portion of the bow being connected to a tooth or to the teeth to be moved by means of a lock clamping device attached to a tooth band. Various types of lock devices have been proposed and used for the correction of irregularities of teeth. Such a device is disclosed in application Serial No. 272,615 now Patent 2,627,112, issued on February 3, 1953. These devices are positioned anteriorly of the teeth and are placed into a locking position either by a locking member moved transversely with respect to a tooth, by tying or otherwise fastening the arch bow to the lock device in a series of operations before the arch bow is correctly positioned or by a locking member moved vertically with respect to a tooth as disclosed in the aforementioned patent.

It is an object of the present invention to provide an orthodontic lock which secures an arch bow thereto by a single operation. It is another object of the present invention to provide an orthodontic lock which will not become disassembled upon rough and careless handling by the operator. It is a still further object of the present invention to provide an orthodontic lock which controls the distance which the clamping member can be raised. Another object of the present invention is to produce an orthodontic lock economically and with a minimum number of forming operations.

Other objects and advantages of the invention reside in certain novel features of construction, combination and arrangement of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming part of this specification, and in which:

Fig. 1 is a plan view of a dental arch equipped with an orthodontic device according to our invention,

Fig. 2 is an assembly view of a preferred embodiment of our orthodontic lock device,

Fig. 3 is a cross-sectional view along lines 3-3 of Fig. 2, and

Fig. 4 is a perspective view of the lock plate of our invention.

According to our invention, we provide a sub-

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stantially flat orthodontic lock comprising a unitary structure having a clamping member cooperating with the main body portion to provide a vertical locking action, said member being retained in cooperating position by portions of the main body structure which also serve to limit movement of said member and to prevent complete disengagement thereof from the body structure at all times. The vertical locking action is advantageous in that it enables the application of the lock to a tooth regardless of the degree of irregularity of the teeth on the dental arch. The entire lock is dimensioned so that the contact area with an arch bow is comparatively small, which allows the arch bow to retain its inherent resiliency to a great extent and also provides the arch bow with sufficient free length to follow an irregular contour of the teeth on the dental arch depending upon the predetermined correction plan for the teeth. An outstanding advantage of our invention is that a more positive retaining and positioning means for the clamping member of our lock device is provided which ensures a quicker positioning of the arch bow and enables easier manipulation of the arch bow since it may be adjusted without entire disengagement of the cooperating lock components.

As shown in Fig. 1, our lock device is positioned anteriorly of a tooth 2 by means of a tooth band 3 to which the lock is secured, as by soldering or welding. A plurality of similar locks 1, each related to a single tooth, are thus positioned by securing each tooth band to its respective tooth, as by crimping, and each lock retains the wire arch bow 4, which can be a single or twin strand, substantially in conformity with a dental arch. The ends of the arch bow, as is well known in the art, are secured to a suitable anchor means 5, e. g. anchor tubes, which are soldered or welded to tooth bands secured to a pair of molars as illustrated.

Fig. 2 shows such a lock in assembled locked position with the arch bow secured thereto. In connection with this figure it is seen that a metal lock base 6 having a lower upturned flange 7 formed thereon is provided with spring face front portions 8, 8 positioned above said flange as shown. The spring faces 8, 8 are formed by bending the side portions 9, 9 of the base 6, which side portions are spaced from the flange 7 to form a slot 26. A spring lock plate 10 is provided to slide within the passageway formed by portions 8, 8, 9, 9 and 6 of such dimensions as to engage the sides of the passageway with a close sliding fit and to provide sufficient vertical freedom of

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motion to allow the plate to be raised a distance sufficient to uncover a passageway to the slot 26 to enable the arch bow to be accommodated therein. The lock plate may also be provided with a means such as notch 12 in its lower extremity into which any suitable pointed instrument may be inserted for raising said plate to disengage an arch bow wire from the lock. Alternately, a notch may be provided in the flange 7 (not shown) to allow for the engagement of plate 10, in which event the notch 12 is eliminated. To obtain a better frictional reception of the plate 10 within base 6 the front portions 8, 8 may have small dimples 14, 14 impressed therein to form small internal abutting surfaces within passageway 16. To obtain a spring action the portions 8, 8 are slightly separated as shown at 18. This spring action may be sufficient to retain plate 10 within passageway 16, in which event dimples 14, 14 may be omitted.

To prevent the accidental separation of plate 10 from base 6 the plate is provided with a pair of oppositely extending outwardly protruding abutments or stop members 30, 30 which are adapted to be aligned with and enter into recesses 31 in the side portions 9 of base 6.

The base 6 may be manufactured from flat stock material preferably a non-corrosive metal such as stainless steel or a precious metal, by bending and shearing or by swaging. The lock plate may be assembled into the base 6 as by bending portions 8, 8 therearound. The lock plate may be formed by swaging.

It is to be understood that the illustrations are considerably enlarged and slightly exaggerated to clearly show the lock structures, the actual lock being dimensioned to form a substantially flat structure against a tooth. As indicative of the small size and flatness of the device the lock may be .125" wide by .120" high and the tooth band to which it is affixed and sold as a unit may be .004" thick by .125" wide and 1 3/4" in length. It is apparent therefrom that a device of this sort is easily handled by an operator in its assembled condition thus avoiding the time consuming operations required in assembling some of the prior art devices.

Alternatively, to ensure a more positive locking action the plate 10 may be extended at its lower end to enter a groove (not shown) in the flange 27 aligned therewith.

It is to be noted that the slot 26 is dimensioned in such a manner that upon closing of the lock plate the arch bow wires are enclosed in a space substantially corresponding in size therewith. Thus, due to the curvature of the bow wire sufficient centrifugal and frictional bearing force is exerted by the bow wires against the spring lock to insure a friction lock and negative the possibility of the lock plate slipping upwards while in use and thus releasing the arch bow. The chamber for the reception of the arch bow wires is formed in part by the cut out portion 32 of the plate 10 which is so dimensioned as seen in Figure 3, to provide frictional contact with the arch bow.

In practice it is obvious that the lock of our invention is especially adapted for use with orthodontic arch bows to readily and securely fasten said bow in proper position upon the tooth bands and maintain said bow fastened against displacement by release of said lock due to the action of food or other forces tending to disassociate the lock plate from the body structure. Furthermore, due to the arrangement of struc-

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ture accomplished by an internal positioning of the lock plate within the body structure the wearer is subjected to less discomfort or annoyance than he would encounter by the use of the prior known lock devices.

While we have shown and described our invention as embodied in certain details of construction, it should be understood that this is primarily for the purpose of clearly illustrating the principles of the invention and that many modifications and changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the following claims.

What we claim is:

1. In an orthodontic lock device having a lock base body structure provided with a laterally extending slot for the reception of an arch bow, a partially enclosed passageway formed in said body intersecting said slot, said body having a spring face front portion forming part of the sides of said enclosure, locking means including a member adapted for sliding movement within said passageway and adapted to be frictionally retained within said passageway by the action of said spring face portion, said passageway and slot being so arranged that when said member covers said slot a chamber is thereby defined for the frictional reception of said arch bow.

2. The orthodontic lock device of claim 1 including means on said member and said base adapted to prevent the accidental separation of the member from the base.

3. The orthodontic lock device of claim 2 wherein said means to prevent accidental separation includes an abutment on the outer surface of said member and a recess in said base in alignment therewith and into which said abutment may be positioned.

4. The lock device of claim 3 wherein said face portion is provided with at least one dimpled recess which projects into said passageway to provide a further frictional means for the retention of said member.

5. An orthodontic lock device comprising a lock base body structure and a locking member of substantially equal width, said body having front and rear surfaces and a lateral slot in its lower end to accommodate an arch bow, a vertical enclosed passageway formed in said body intermediate its front and rear surfaces and extending substantially the width thereof to accommodate said locking member for vertical sliding movement, a lower end portion on said base for restricting downward movement of said locking member, said base structure being provided with spaced spring face portions forming part of the sides of the enclosed passageway engageable with said locking member in a vertical guiding relationship and so formed as to frictionally retain said member within the passageway, said passageway and slot being so arranged that when said member rests on said end portion there is provided a chamber for frictional reception of said arch bow.

6. The orthodontic lock device of claim 5 including means on said member and said base adapted to prevent the accidental separation of the member from the base.

7. The orthodontic lock device of claim 6 wherein said means to prevent accidental separation includes an abutment on the outer surface of said member and a recess in said base in alignment therewith and into which said abutment may be positioned.

8. The lock device of claim 7 wherein said face portion is provided with at least one dimpled recess which projects into said passageway to provide a further frictional means for the retention of said member.

9. The lock device of claim 7 wherein said member has a cut out portion extending the full width of the lower end thereof and adapted to cooperate with the base and lower end portion to provide a chamber for the frictional reception of the arch bow.

10. An orthodontic lock having a lock base body structure provided with a laterally extending slot for the reception of an arch bow, a partially enclosed passageway formed in said body intersecting said slot, said body having a spring face front portion forming part of the sides of said enclosure, locking means including a member adapted for sliding movement within said passageway and adapted to be frictionally retained within said passageway by the action of said spring face portion, the member being provided with a cut out portion extending the full width of the lower end thereof and adapted to cooperate with the base and slot to provide a chamber for the frictional reception of the arch bow.

11. The lock of claim 10 wherein said member has a portion thereof provided with a means enabling the release of said arch bow from said chamber.

12. An orthodontic lock device comprising a thin walled lock base body structure and a locking plate member of substantially equal width, said body having front and rear surfaces and a lateral slot in its lower end to accommodate an arch bow, a vertical partially enclosed passageway formed in said body substantially perpendicular to said slot intermediate the front and rear surfaces, said front surface consisting of a pair of spaced spring face portions to accommodate said locking plate for vertical sliding movement, a lower end portion on said base for restricting downward movement of said base member, at least one abutment integral with the lower end of said plate and extending outwardly from the side portion thereof, a recess in the side wall of said base in alignment with the abutment and into which the abutment may be positioned to prevent the accidental separation thereof, said face portions being each provided with a dimpled

recess projecting into said passageway to provide a further frictional means for the retention of said member, a cut out portion extending the full width of the lower end of the plate, said passageway being spaced a sufficient distance transversely from the base of said slot as to provide in cooperation with the cut out portion a chamber for frictional reception of said arch bow when said plate is in its lowered position and rests against said end portion, the top edge of said locking plate cooperating with the top edges of said body member to form an externally smooth top surface, said plate being provided with a notched hole extending laterally thereof and into which an instrument may be inserted for raising the plate.

13. In an orthodontic lock device having a lock base body structure provided with a laterally extending slot for the reception of an arch bow, a partially enclosed passageway formed in said body intersecting said slot, said body including spring face means, locking means including a member adapted for a sliding movement within the said passage way and adapted to be frictionally retained within said passageway by the action of said spring face means, said passageway and slot being so arranged that when said member covers said slot a chamber is thereby defined for the frictional reception of said arch bow.

14. The orthodontic lock device of claim 13 including means on said member and said base adapted to prevent the accidental separation of the member from the base.

15. The orthodontic lock device of claim 14 wherein said means to prevent accidental separation includes an abutment on the outer surface of said member and a recess in said base in alignment therewith and into which said abutment may be positioned.

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