ORTHODONTIC LOCK PIN

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ABSTRACT OF THE DISCLOSURE

An orthodontic lock pin for use with a bracket mounted on a band to lock an arch wire to a tooth, wherein the lock pin includes a knife-edge facing the arch wire to facilitate tipping of the tooth during orthodontic treatment without interfering in any way with the desired function of the bracket.

This invention relates in general to a lock pin for use with orthodontic brackets to lock an arch wire thereto, and more particularly to a lock pin having a knife-edge coating with the arch wire to facilitate tipping of a tooth.

The face of the head of lock pins heretofore known was flat and would extend normal to the gingival-occlusal axis of the bracket. Because of this flat face which faces the arch wire, tipping of the tooth and bracket relative to the arch wire is inhibited, when the arch wire abuts against this face. With this configuration, it is necessary to construct the pin with the smallest possible thickness, and likewise construct the bracket for the pin of lighter material in order to obtain even the best possible tipping conditions.

The lock pin of the present invention overcomes the difficulties above referred to relative to the prior art by providing a knife-edge on the face of the pin head that faces the arch wire to facilitate tipping action between the arch wire and bracket. With the present invention, it is possible to increase the width of the pin and construct the bracket of heavier material. Further, it is possible to construct the arch wire receiving slot of lesser depth to even further strengthen the bracket. Inasmuch as it is well known that brackets and pins receive their greatest fear at the occlusal end and normally fail there, the lock pin of the present invention will enable heavy duty construction of the pin and the corresponding bracket to provide longer wearing appliances.

An object of the present invention is to provide a new and improved lock pin for use with orthodontic brackets.

Another object of this invention is in the provision of a new and improved lock pin that is constructed to facilitate tipping of teeth, and which can be made stronger and of heavier duty construction to provide longer life.

A further object of this invention resides in the provision of a lock pin having a knife-edge face on the head to coat with the arch wire and facilitate tipping of the teeth.

Other objects, features and advantages of the invention will be apparent from the following detailed disclosure, taken in conjunction with the accompanying sheet of drawing, wherein like reference numerals refer to like parts, in which:

FIG. 1 is a fragmentary view of an arch of a person, illustrating a plurality of teeth having appliance mounted thereon that include the lock pin of the present invention, and also showing the association with an arch wire;
FIG. 2 is an exploded perspective view, partially fragmentary, of a bracket and the lock pin of the present invention;
FIG. 3 is a cross sectional view of the lock pin according to the present invention and shown in position on a bracket, and taken substantially along line 3—3 of FIG. 1, but illustrating the pin as inserted prior to bending the tail over the bracket;
FIG. 4 is a side elevational view of the lock pin according to the present invention;
FIG. 5 is a front elevational view of the lock pin of FIG. 4 looking at the knife-edge end;
FIG. 6 is a sectional view taken substantially along line 6—6 of FIG. 4;
FIG. 7 is an enlarged fragmentary view illustrating the embodiment of FIG. 4 in connection with an arch wire;
FIG. 8 is a fragmentary front elevational view similar to FIG. 5, but illustrating another embodiment of the invention, wherein the knife-edge is along one edge of the pin; and
FIG. 9 is a view similar to FIG. 8 but illustrating another embodiment wherein the knife-edge is located adjacent the other edge of the pin.

Referring now to the drawings, and particularly to FIG. 1, a plurality of teeth 10 are illustrated with brackets 11 suitably secured thereto such as by cementing. A lock pin and bracket appliance 12 is suitably secured to each of the bands, such as by soldering or welding, where-in the pins are mounted on the brackets to lock the arch wire 13 in place. The pin and bracket appliance 12 includes a bracket 14 and a pin 15 according to the present invention.

The bracket 14 may be of any suitable type that would receive a pin according to the present invention, and the configuration illustrated is only exemplary of one type that may be employed, and which would include a body 16 with mesial and distal extending ears 17 that serve to attach the bracket to a tooth band. The attaching ears 17 would lay substantially flat or flush against the tooth band and be suitably soldered or welded in order to anchor the bracket to the band. The body 16 includes substantially buccal-lingually extending side walls 18 and 19 interconnected at their buccal ends by a mesially extending wall 20. The walls form a gingival-occlusal extending opening 21 that is adapted to receive a lock pin such as the lock pin 15 according to the present invention. A notch is formed in the body at the gingival and lingual corner to define a slot 22 to receive the arch wire. The ears 17 are connected to the lingual ends of the body side walls 18 and 19. Usually, the gingivally-lingually extending opening 21 is of a substantially rectangular cross section, as in the cross section of the pin to preclude relative rotation between the pin and bracket when the pin is in operative position.

As already explained, the use of the pin according to the present invention enables heavier construction of the bracket to provide longer wear. In this regard, the walls of the body may be made of heavier gauge metal together with the attaching ears. Further, the arch wire receiving slot 22 need not be as deep with the lock pin of the present invention, thereby reducing the tendency to weaken the bracket as would be the case where a slot of greater depth is needed. By making the walls of heavier material, the occlusal end of the bracket will withstand greater wear and minimize the necessity of having to replace the bracket during treatment of a patient. Further, a wider pin may be provided, the tail end of which normally being at the occlusal end can withstand longer wear.

The lock pin 15 of the present invention and as shown in the embodiment of FIGS. 1—6 includes an elongated, rectangular in cross section, shank 24, and an enlarged head 25 at one end.
A wire retaining portion 28 of the head extends lingually of the shank 24 and terminates in a nose 29. When the pin is assembled with the bracket, the nose 29 will extend to the band 11 and close the gingival end of the slot 22 to lock the arch wire 13 therein as seen in FIG. 3.

In order to facilitate tipping of the tooth relative to the wire, the gingival face of the wire retaining portion 28 is provided with a knife-edge portion 30 that is centrally located between the opposite side 25a and 25b of the pin head 25. Thus, the knife-edge portion is defined by inclined faces 30a and 30b which readily permit tipping of the tooth, upon which the pin and bracket appliance is mounted, in either direction relative to the arch wire 13 which engages the knife-edge portion 30 centrally of the pin. As seen in FIG. 7, the lock pin 15 permits freedom of movement of the wire relative to the bracket enabling tipping action.

The pin 15A of the embodiment shown in FIG. 8 differs from the pin 15 shown in FIGS. 1–6 only in that the knife-edge portion 31 is positioned along the side 25a of the pin head 25, and provided with only a single inclined surface 31a. This embodiment would permit greater tipping in the direction of the arrow 32, rather than an equal amount in both directions as in the embodiment of FIGS. 1–7.

Similarly, the pin 15B in the embodiment of FIG. 9 differs only in that the knife-edge portion 33 is located at the side 25b of the pin head 25 to permit tipping in the opposite direction from that of the embodiment of FIG. 8 and as shown by the arrow 34. Otherwise, the embodiments of FIGS. 8 and 9 also operate the same as the embodiment of FIGS. 1–7.

The invention is hereby claimed as follows:

1. An orthodontic lock pin comprising a shank for insertion in an occlusal-gingivally extending wire receiving notch, a head at one end of the shank, said head including a shoulder extending lingually from the shank to coat with said notch and lock the wire into said notch and to said bracket, said shoulder having a buccal-lingually extending knife-edge facing the wire to facilitate tipping between the wire and the pin.

2. An orthodontic lock pin as defined in claim 1, wherein said knife-edge is centrally located on said shoulder.

3. An orthodontic lock pin as defined in claim 1, wherein said knife-edge is mesially located on said shoulder.

4. An orthodontic lock pin as defined in claim 1, wherein said knife-edge is centrally located on said shoulder.

5. An orthodontic lock pin as defined in claim 1, wherein said shank is rectangular in cross-section.

6. An orthodontic lock pin and bracket appliance comprising a bracket secured to a tooth band having a body extending outwardly thereof, an occlusal-gingivally extending opening in said body and a mesial-distally extending notch at the gingival-lingual corner of said body, a mesial-distally extending arch wire received in said notch, and a lock pin received in said opening and coating with said notch to secure the arch wire to said bracket, said lock pin having an elongated body with a buccal-lingual thickness less than the buccal-lingual depth of said opening at the notch and a head, said head having a lingual extending shoulder coating with the band to lock the arch wire in said notch, said lingual extending shoulder having a buccal-lingually extending knife-edge at the wire facing side for coating with the wire to facilitate tipping between the wire and bracket.

7. An orthodontic lock pin and bracket appliance as defined in claim 6, wherein said knife-edge is centrally located on said shoulder.

8. An orthodontic lock pin and bracket appliance as defined in claim 6, wherein said knife-edge is along the mesial edge of said shoulder.

9. An orthodontic lock pin and bracket appliance as defined in claim 6, wherein said knife-edge is along the distal edge of said shoulder.

10. An orthodontic lock pin and bracket appliance as defined in claim 6, wherein said pin has a relatively wide mesial-distal dimension.

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