This invention relates to improvements in fracture splints and orthodontic appliances. More particularly, this invention relates to an arch bar for use in reducing and immobilizing fractures of the mandible and/or maxilla as well as immobilizing subluxated, impacted or fractured teeth.

Arch bars, as presently known in the art, generally comprise elongate metallic strips or wires having a plurality of ligature lugs or hooks uni-directionally oriented along a single longitudinal edge. These prior art arch bars universally have certain limitations and disadvantages associated with their installation and use in the mandibular and maxillary regions of a patient's mouth. For example, it is sometimes necessary to provide for occlusion between the teeth of opposing jaws whereupon both a mandibular arch bar and a maxillary arch bar are secured to the corresponding dental arches by means of wire ligatures. Thereafter, intermaxillary elastics or wires (ligatures) are laced between the ligature lugs of the two arch bars. Frequently, the arch bars are installed so that the ligature lugs are misoriented and face in the wrong direction for the lacing operation. Consequently, the arch bars must be removed and reinstalled with the ligature lugs in proper orientation. As a result, a considerable amount of time is lost through the necessary duplication of installation steps and, perhaps more important, there is an additional duration of discomfort to the patient.

Moreover, the prior art dental arch bars presented a potential hazard with respect to catching oral lacerations or granulation tissue that may be present, or causing lacerations of the oral mucosa due to the exposed relatively sharp corners and edges on the ligature lugs as well as the sharp twisted ends of the ligature wires attached to the arch bar.

Furthermore, certain limitations are encountered with the prior art arch bars in the event it is necessary to employ suspensory wires from the upper facial bones in addition to the intermaxillary ligatures. Since the arch bars have only a single set of uni-directionally oriented ligature lugs, the situation arises where an arch bar wherein lugs are available for attachment of one or the other of the intermaxillary ligatures and suspensory wires. Thus, it is necessary to improvise the attachment of either the ligatures or suspensory wires when both are employed.

BRIEF DESCRIPTION OF THE INVENTION

In accordance with this invention and as illustrated in FIGURE 1, there is provided an arch bar 10 which generally comprises an elongate, thin strip 11 having a plurality of ligature lugs 12 and 13 periodically arranged in pairs along its length. The strip 11 is sufficiently flexible so that it may be conformed to the curvature of a dental arch yet has adequate rigidity to enable it to function as a support. The ligature lugs comprising each pair are specifically positioned in an opposed manner so as to provide the arch bar 10 with a means for attachment of ligature wires or intermaxillary elastics along each edge from opposite directions. The advantages of this lug arrangement are believed readily apparent, however, they will be more fully appreciated with reference to FIG. 5 which is discussed in detail later in this disclosure.

In further describing the structural features of the ligature lugs reference should be made to FIGS. 2 and 3 wherein a single pair of opposed lugs 12 and 13 on the strip 11 are shown in detail. Each of the lugs is formed by a segment of a mutually triangulated arch bar wherein lugs are available for attachment of one or the other of the intermaxillary ligatures and suspensory wires. Thus, it is necessary to improvise the attachment of either the ligatures or suspensory wires when both are employed.
by distance X. Thus, when the segments are folded over their triangular configuration produces a slot 15 which extends diagonally between the lugs 12 and 13. The slot 15 permits each lug to be independently used but also allows each lug to substantially overlie the entire transverse dimension Z of the strip 11. As a result, the chances of the ligature wires or intermaxillary elastics becoming accidentally disengaged from the lugs are substantially reduced. Moreover, the triangular configuration of the segments reduces to a minimum the number of corners on each lug, each of which is rounded to eliminate sharp edges, thereby making it less likely for the oral tissue to snag on the lugs when the arch bar has been installed in the patient's mouth. This advantage is also achieved in part from the fact that the lugs 12 and 13 overlie the face of the strip 11 in a parallel manner.

It should be appreciated that the above-described arch bar 10 is of relatively small dimensions. In order to obtain a clearer understanding of the invention, the following dimensions of the arch bar are given solely for purposes of example. The width Z of the strip 11 may be of the order of 2 mm, while the width Y of the lugs 12 and 13 may be of the order of 3 mm. The offset distance X may be about 1 mm.

Referring next to FIG. 4, there is shown another embodiment of the arch bar comprising this invention wherein in the ligature wires have been slightly modified as compared to the previously described arch bar. The ligature lugs 22 and 23 in this embodiment are positioned in alignment and directly opposite each other along strip 21. Again, the lugs are formed by triangularly configured segments which extend outward from opposite longitudinal edges of the strip 21 and have been folded to overlie the face of the strip. However, the segments in this embodiment are somewhat shorter in length (measured in the transverse direction of the strip) so that the lugs 22 and 23 terminate short of each other while still providing a slot 25 which extends diagonally between the lugs and substantially overlies the entire transverse dimension of the strip.

Even though the size of the lugs 22 and 23 of this embodiment of the arch bar has been reduced the same general advantages of the previously described arch bar are present. In addition, by eliminating the offset distance between the lugs the pointed corners of the lugs become even less exposed to the oral tissue when the arch bar has been installed.

The employment of the arch bars of this invention may be best understood with reference to FIG. 5 wherein a pair of arch bars 30 and 40 are shown installed, respectively, to the maxilla or upper jaw A and to the mandible or lower jaw B. As is apparent, the arch bars 30 and 40 are positioned by ligature wires passed around certain teeth of the patient so as to lie parallel to the dental arch and also, while not readily apparent from the illustration, are adjusted to conform with the curvature of the dental arch.

Referring back to FIG. 5, it may be seen that the arch bars 30 and 40, after having been installed in the manner described above, serve to substantially immobilize the areas of the upper jaw A and the lower jaw B in which the arch bars 30 and 40 are positioned. Moreover, regardless of the orientation of the arch bars as installed, it is always possible to place intermaxillary wires or elastics W between the arch bars to provide proper occlusion between the teeth of the upper and lower jaws A and B due to the availability of ligature wires arranged along each longitudinal edge of the arch bar. In addition, suspensory wires S from facial bones, as indicated by the dotted lines in FIG. 5, may be easily attached to the set of ligature lugs of arch bar 30 which are unused in the lacing operation.

It should also be readily apparent that the particular construction and arrangement of the ligature lugs on the strip of the arch bar substantially eliminates any exposed sharp protruding areas which could result in lacerations of the oral tissue. In this respect, it is pointed out that the lugs may also function as shields for the cutting ends of any ligature wires employed as well as for tying two abutting arch bars together in the event this is desirable.

While the arch bar of this invention has been illustrated as having a definite length and a specific number of pairs of ligature lugs, it should be understood that the arch bar may be of indefinite length and merely cut into segments of desired length when used. Moreover, the ligature lugs may be varied in number and in spacing from that which is illustrated. Further, while the ligature lugs are shown as being integral with the strip of the arch bar, it is also possible to separately secure them to the strip.

The arch bar of this invention is preferably constructed from a metallic material, such as a high quality stainless steel or german silver, but it is also possible to employ other materials having the desired properties of flexibility and rigidity.

I claim:

1. Orthodontic appliance of a size and shape to be inserted in the oral cavity and a length to conform to the curvature of a dental arch to reduce and immobilize fractures of the jaws and to immobilize or reorient subluxated, impacted and fractured teeth comprising a flexible elongate flat strip having a plurality of pairs of opposed lugs periodically spaced therealong for attaching intermaxillary wires or elastics thereto, the lugs of each pair being substantially triangular in configuration and extending from opposite longitudinal edges of the strip to overlie in spaced relationship adjacent areas of the same planar face of the strip while forming a diagonally extending slot therebetween.

2. Orthodontic appliance of claim 1 wherein the lugs of each pair are laterally offset with respect to each other and are of a length such that each lug overlies the entire transverse dimension of the strip while forming a diagonally extending slot therebetween.

3. Orthodontic appliance of claim 1 wherein the lugs of each pair are positioned in alignment with and directly opposite each other and are of a length such that each lug overlies substantially the entire transverse dimension of the strip while forming a diagonally extending slot therebetween.

4. Orthodontic appliance of claim 1 wherein the lugs are spaced from the elongate strip a distance sufficient to receive only intermaxillary wires and elastics, and the space defined by the lugs and the elongate strip is of a size such that the intermaxillary wires and elastics only partially fill the space.

5. Orthodontic appliance of claim 1 wherein the lugs have the shape of a substantially right triangle and the edges of the lugs which approximate the hypotenuse of the right triangle define the diagonally extending slot.

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