

[54] **CALIBRATED BRACKET SECURING MEANS**

3,237,305 3/1966 Hegedus 32/14 A

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[57]

ABSTRACT

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[58] Field of Search 32/14 A

Disclosed is a generally U-shaped securing device for engaging the labial or buccal, lingual, and incisal or inclusal surfaces of a tooth and locating and clamping thereto an orthodontic attachment of the type which may be affixed to a tooth by an adhesive or the like. Disclosed as well is the method of applying the same.

[56] **References Cited**

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11 Claims, 9 Drawing Figures

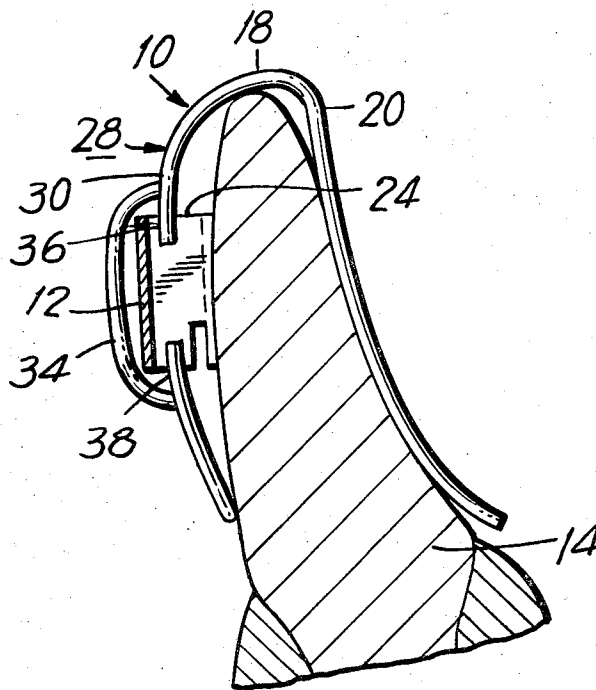


FIG. 1

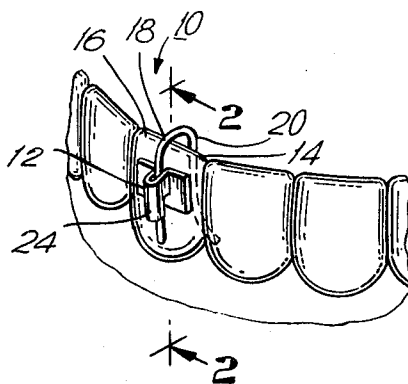


FIG. 2

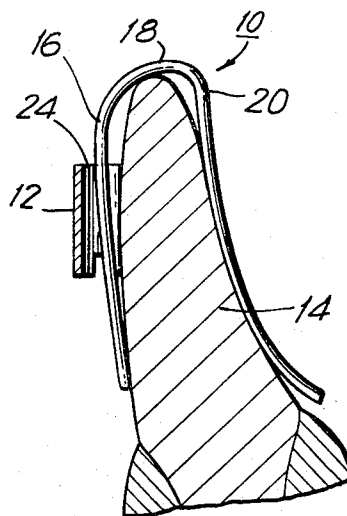
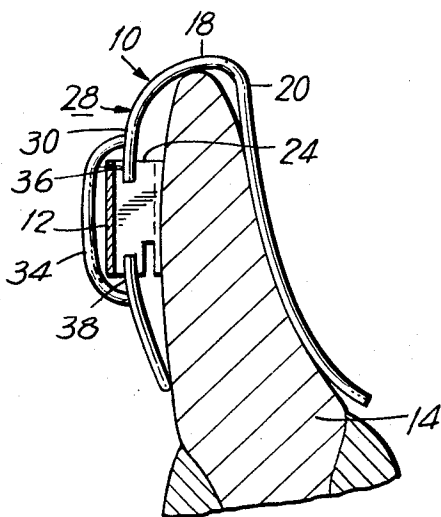
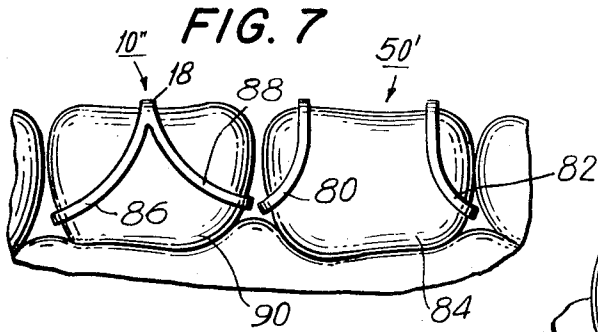
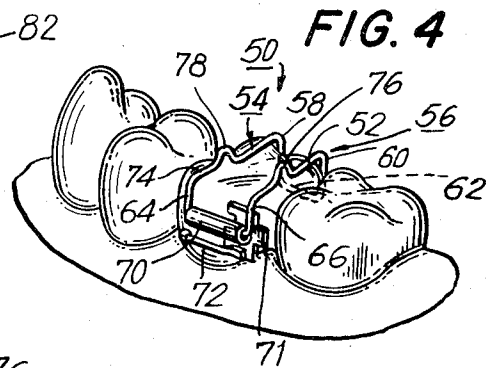
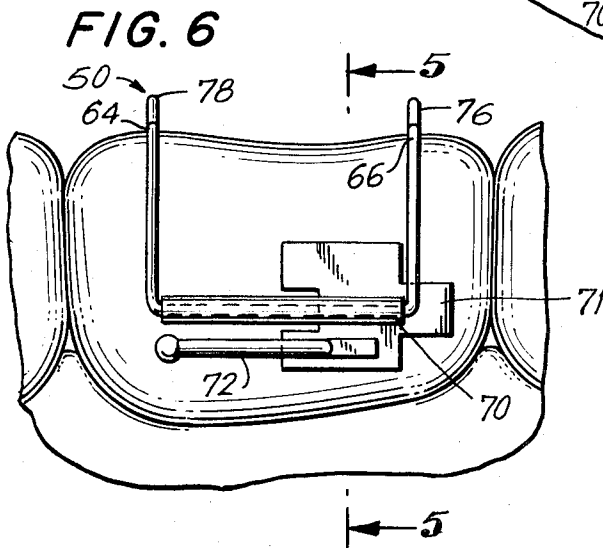
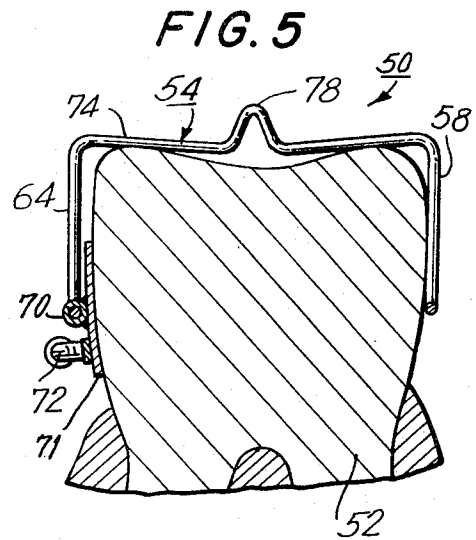
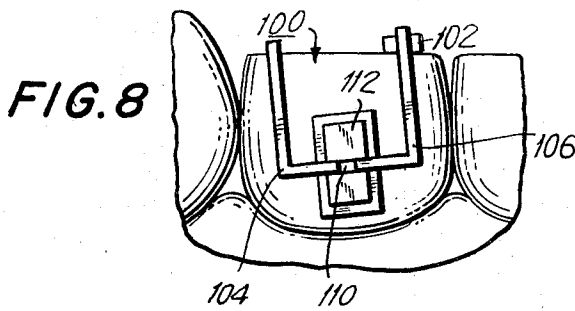
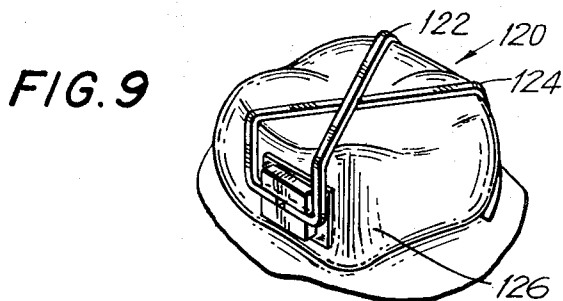


FIG. 3





CALIBRATED BRACKET SECURING MEANS

BACKGROUND OF THE INVENTION

This invention relates to orthodontia and more particularly to a means and method for securing brackets and other attachments of the type affixed to teeth by adhesive or the like.

It is well known to attach or affix an attachment to a human tooth by first securing the attachment or bracket to a metal band which is then placed about the tooth. Thereafter, an arch wire may be connected to the attachment or bracket and other attachments similarly disposed with the object of applying a controlled force in a predetermined direction to correct some malalignment of the teeth. However, such devices have certain inherent disadvantages. In order to attach the bands it is sometimes necessary to strip away the enamel of either the banded tooth or adjacent teeth so that the band may be placed about the tooth. In addition, the band material may cause gingival irritation and infection. The bands may also serve as a repository for food particles thereby contributing to the formation of caries.

One suggested way of avoiding these difficulties is to secure the attachment or bracket to a tooth by an adhesive, such as an epoxy or the like. One difficulty that arises with this approach is that placement of the attachment from the incisal or incisal surface or edge of a tooth is of critical importance. Thus, accuracy of placement becomes an exceedingly difficult goal when the dentist is required to manually hold the attachment in place against the patient's tooth while the adhesive sets. Manual application of the attachment may be made a useless if not frustrating exercise. In addition, requiring the dentist to hold the attachment in place makes it difficult for him to set more than one attachment at a time and places the patient in an uncomfortable position requiring him to hold his mouth in an open position with the dentist's hand holding a bracket against the tooth. What is more, this must be done for each attachment to be installed. This process is believed to be as lengthy as it is uncomfortable. In addition, the adhesive used to secure the attachment can clog or fill the spaces within which are carried the arch wire and, it is believed, rendering the attachment useless.

SUMMARY OF THE INVENTION

In accordance with the teachings of this invention there is disclosed securing orthodontia means for use in connection with a tooth. The means comprises orthodontic attachment and securing means maintaining the attachment at a predetermined distance from the biting edge of the tooth.

In one embodiment of the invention, the securing means is in the form of a generally U-shaped wire. The attachment is in the form of a bracket on a plate fitted on one leg of the wire and the wire is placed over a tooth with the bracket plate on the labial side of the tooth. The base of the U engages the incisal edge of the tooth thereby locating the bracket with respect thereto. Adhesive has been placed on the plate. The U-shaped wire is resilient and presses against the lingual side of the tooth and forces the bracket plate against the labial side until the adhesive sets. The wire is thereafter removed.

In another aspect of this invention there is provided securing means for use in connection with the treatment of a tooth. The securing means comprises an orthodontic attachment means, which may include, for example, a plate, bracket or the like, and means for clamping the orthodontic attachment against the tooth.

In still another aspect of this invention there is provided the method of securing an orthodontic attachment to a tooth. Thus, there is provided a securing means. Adhesive is applied to the attachment and the tooth. The securing means clamps the attachment to the tooth.

Thus, it is an object of this invention to provide a means for securing an attachment to a tooth with greater accuracy than has heretofore been possible.

It is a further object of this invention to provide means for securing an attachment to a tooth wherein the attachment is to be adhered to the tooth.

It is yet another object of this invention to provide a simplified method of locating and clamping an attachment to a tooth.

It is still a further object of this invention to provide a device for clamping an attachment to a tooth and, at the same time, prevent adhesives from entering into the arch wire engaging and ligating portions.

It is a further object of this invention to provide a device which is simple in construction, use and manufacture which reduces the time consuming task for both patient and dentist of securing orthodontic attachments to the teeth of the patient.

These and other objects will become more apparent after consideration is made of the drawing when taken with the description of the preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a securing device constructed in accordance with the teachings of this invention shown engaging a tooth;

FIG. 2 is a sectional view of the device taken along lines 2—2 of FIG. 1 and looking in the direction of the arrows;

FIG. 3 is a sectional view of a device similar to that of FIG. 1 taken along similar lines as that of FIG. 2 but presenting another embodiment thereof;

FIG. 4 is a perspective view of still another embodiment of a device constructed in accordance with the teachings of this invention;

FIG. 5 is a sectional view of the device of FIG. 4, but taken along line 5—5 of FIG. 6;

FIG. 6 is an enlarged front plan view of the device of FIG. 4;

FIG. 7 is a plan view showing an embodiment of this invention wherein a portion thereof engages the interproximal area of teeth;

FIG. 8 is a front plan view of still another embodiment of this invention; and

FIG. 9 is a further embodiment of the teachings of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawing, there is disclosed a generally U-shaped securing means or device 10 (FIG. 1). While a substantially round wire-like member 10 is disclosed, it will be understood that any generally U-shaped configuration will suffice. Thus, the wire may

have a generally circular cross section, as shown, or a rectangular cross section (not shown). For that matter, the device 10 may not necessarily be constructed of wire but may be made of a molded substance such as plastic or any or any other structural material. The desired result is to secure an attachment, which may be, for example, a bracket 12 to a tooth 14 in such a way as to locate and clamp the attachment 12 while an adhesive or other bonding agent (not shown) affixes the attachment 12 to the tooth 14. The attachment 12, as indicated above, is a bracket. Other attachments contemplated may well include plates, tubes, or the like all of which are well known in the art.

The bracket 12 is first placed on one leg 16 of the device 10. The bracket 12 is then located a predetermined distance from the base 18 of the U-shaped securing device 10. The location of the bracket 12 (or any other attachment) may be predetermined by a mechanical interlinkage such as a matching notch and burr (not shown) or by adhesives or the like. The bracket 12, which in the example disclosed is a Begg bracket, has a centrally disposed channel which is generally disposed, perpendicularly to the arch wire. The leg 16 is placed in this channel 24.

Once the bracket 12 has been located on the leg 16 and placed against the tooth 14, the other leg 20 in combination with the first leg 16 serves to clamp the bracket 12 until the adhesive has set. It is to be understood that the legs 16 and 20 are placed on opposed sides of the tooth 14. Thus, one leg is shown on the labial or buccal side of a tooth while the other leg is against the lingual side. Attachments, however, may be secured to either side of a tooth. For the purpose of this description, and the claims that follow, the side to which an attachment is to be secured, whether labial, buccal, or lingual, will be referred to as the labial side. In addition, the leg holding the attachment or clamping the attachment will, in a like manner be termed the labial or first leg. In order to further simplify the discussion herein, incisal and incisal surfaces and edges of the teeth are referred to generally as the biting surfaces or edges. Finally, the leg opposed to the labial leg will be uniformly referred to as the lingual or second leg.

In use, the bracket 12 is first located on the first leg 16 and an adhesive, such as for example an epoxy, is applied to the surface of the bracket 12 and to the surface of the tooth 14. The adhesive coated surface of the bracket 12 is brought into contact with the coated tooth surface. The U-shaped device 10 retains the bracket 12 in position until the adhesive sets. As discussed above, the Begg bracket 12 is releasably held by the leg 16 of the device 10. The leg 16 extends through the bracket's vertically disposed channel 24. Once the bracket 12 is adhered the device 10 may be removed. In the embodiment disclosed in FIGS. 1 and 2, removal is made by withdrawing the leg 16 from the channel 24.

One preferred way of easily locating the bracket 12 with respect to the biting edge of a tooth is to provide locating means of the type disclosed in connection with a device 10' (FIG. 3). In that embodiment, the labial or first leg 28 comprises a first vertical part 30 joined to a second vertical part 32 by a C-shaped member 34. The first and second parts 30 and 32, respectively, continue the same line of the leg 16 of the device 10 of FIGS. 1 and 2. The C-shaped member 34 may be secured to the first and second parts 30 and 32, respec-

tively, by (in the case of metal) solder, welding, or the like. In the alternative, if the material used is a plastic then the joining of the three parts 30, 32, and 34 may be made by molding or the like. Ends 36 and 38, of the first and second parts 30 and 32, respectively, extend between the ends of the C-shaped member 34. These ends 36 and 38, in combination with the C-shaped member 34, provide a resilient clip for engaging the channel 24 of the bracket 12. Thus, by bending or flexing the C-shaped member 34 the ends 36 and 38 can be inserted into and removed from the channel 24 of the bracket 12. In this way, the device 10' can be reused with other brackets or attachments.

The principals of this invention may, as has been previously indicated, be carried forward with other attachments. For example, there is disclosed a generally U-shaped securing device 50 (FIG. 4) for engaging a buccal tube bracket 70. The bracket 70 is, in turn, secured to a plate 71. The U-shaped securing means 50 comprises two substantially parallel U-shaped members 54 and 56, respectively. The legs 58 and 60 of the U-shaped members 54 and 56, respectively, are joined by a laterally extending member 62.

The opposed labial legs 64 and 66 of the U-shaped members 54 and 56, respectively, have laterally and inwardly extending leg portions (shown in phantom in FIG. 6). The laterally extending portions of the legs 64 and 66 within the buccal tube 70 block entry of adhesives. (In the same way, the leg 16 of the device 10 (or 10') blocks adhesives from clogging the arch wire and ligating portions of the bracket 12.)

While the various sections of the securing device 50 have been described as separate elements, it is clear that it may be formed of a single element, such as for example metal wire or molded plastic. The bracket 70 of this type is, as has been noted, engaged by the legs of the device 50. The lateral portions of the labial legs 64 and 66 are easily removable from the attachment by spreading the legs 64 and 66 apart. In this way, the device 50 may be reused. As indicated in connection with the C-shaped portion of the device 10' of FIG. 3, the lateral portions of the device 50 automatically locate the attachment with respect to the biting edge. The buccal tube bracket 70 may also include other attachments, as is well known in the art, such as for example, an intermaxillary hook 72.

The bracket 70, in combination with the plate 71, is located with respect to the biting edge of a tooth by means of the distance between the lateral portions of the labial legs 64 and 66 to the bottom or biting edge engaging members 74 and 76, respectively, of the associated members 56 and 58.

It may also be desirable to have means for varying the tension of the securing devices. Thus, for example, each U-shaped member 54 and 56 of the device 50 is provided with a V-shaped boss or bend 78. Thus, if the device 50 is placed over a bicuspid 52 having wider buccal to lingual dimensions or thicknesses than may be accounted for by the distance between the legs of the device 50, the V-shaped portions 78 will give accordingly.

In another aspect of this invention there is disclosed a generally U-shaped member 100 (FIG. 8) which, by use of a shim 102, can be used to angulate an attachment. Thus, the member 100 may be similar to that disclosed in connection with FIG. 6 and have the laterally extending portions of the labial legs 104 and 106 en-

gage the attachment. Here, for example, the attachment is an edgewise bracket 112 (which may, in turn, be secured to a plate). The labial legs 104 and 106 engage the center channel 110 of the bracket 112. The shim 102, therefore, serves to angulate the bracket 112.

In order to inhibit a device constructed in accordance with the teachings of this invention from riding or moving up along a tooth, the legs 80 and 82, which are opposed to the labial legs of the device 50' (which is similar in shape and function to the device 50 disclosed in FIG. 4) may curve outwardly to grip the interproximal area at either side of the tooth 84 (FIG. 6). In the same manner, a bracket securing device 10'' having a general configuration of the securing device 10 of FIGS. 1 and 2, is provided with two legs 86 and 88 which are opposed to the labial leg and are joined to the base member 18. These legs 86 and 88 engage the interproximal area.

A generally U-shaped securing means 120 is disclosed in FIG. 9 and comprises two wire like members 122 and 124. The members 122 and 124 extend up one side of a tooth 126 and cross on the biting surface of the tooth in an X configuration. The wires 122 and 124 may be secured at the X, engage an attachment on the labial side and engage the interproximal areas on the opposed side.

Clamping, as discussed herein, is directed to pressure brought about by the pressure of the opposed legs. This clamping may be the result of the pressure inherent in the grip of resilient members or by other means (not shown). These means may include, by way of example only, the use of a screw or similar mechanism affixed to the labial leg and against the attachment. Thus, as the screw is tightened the legs are drawn together thereby clamping the attachment.

By locating an attachment a predetermined distance on the so-called labial leg or legs from the biting edge (i.e. from the base member of the U-shaped device), the accurate location of such attachments is assured. This distance may be, for example, three, three and one half, or four millimeters from the biting edge. A shim (as discussed above) will permit an adequate amount of angulation.

In use, such securing devices clamp and locate attachments, enabling a dentist to accurately place a plurality of such attachments at one time. In this way, the dentist may evaluate the positions of the attachments with respect to the forces desired before setting the arch wire, elastics, or the like. It is clear that alternate forms of attaching the securing device to attachments will suggest themselves to those experienced in the art (e.g. by a light adhesive bond to a button bracket, etc.), as well as other configurations.

What is claimed is:

1. Means facilitating the securement and location of an orthodontic attachment on a tooth, said means comprising in combination with an orthodontic attachment: a generally U-shaped securing device having a first leg, dimensioned to lie over one face of a tooth and releasably engaging the attachment to be secured in a desired location on the tooth face; a second leg spaced from said first leg and dimensioned to lie over a face of the tooth opposed to said one face, and a base connecting said first and second legs, said base dimensioned to extend over the biting surface of the tooth and biasing

said legs toward said tooth faces to maintain said attachment in pressing contact with the faces of the tooth over which it has been selectively positioned, whereby the orthodontic attachment may be selectively held at a desired position on a tooth by engagement with one of said legs, with said device subject to selective removal after said attachment has become affixed to the tooth.

2. Means facilitating the securement and location of an orthodontic attachment as in claim 1 in which said attachment comprises a Begg-type bracket having a central channel; and said first leg of said securing device engages in said central channel.

3. Means facilitating the securement and location of a Begg-type bracket as in claim 2 in which said first leg comprises a C-shaped portion having ends engaging said channel.

4. Means facilitating the securement and location of an orthodontic attachment as in claim 1 in which said first leg comprises two laterally spaced wire-like members.

5. Means facilitating the securement and location of an orthodontic attachment as in claim 4 in which said attachment comprises a buccal tube bracket, and the ends of said wire-like members engage in said buccal tube.

6. Means facilitating the securement and location of an orthodontic attachment as in claim 1 in which said second leg is formed with an angularly disposed leg gripping the interproximal areas on the sides of the tooth.

7. Means facilitating the securement and location of an orthodontic attachment as in claim 1 in which screw means extend from said securing device to said attachment.

8. Means facilitating the securement and location of an orthodontic attachment as in claim 1 including shims between said device and the tooth.

9. The method of securing an orthodontic attachment on a tooth comprising:

- providing a securing means;
- locating the attachment on the tooth a predetermined distance from the biting edge of the tooth with said securing means;
- applying adhesive between the attachment and the tooth; and
- clamping the attachment to the tooth with said securing means.

10. The method as recited in claim 9 further comprises:

- the step of providing said securing means comprises providing a generally U-shaped member releasably securing the attachment to one leg of said U-shaped member;
- the step of clamping comprises forcing the bracket into contact with one surface of the tooth by pressure against the lingual and opposed surfaces of the tooth
- engaging the biting edge of the tooth with the base member of said U-shaped member.

11. The method as recited in claim 10 further comprises removing said U-shaped member from the attachment after the adhesive has bonded the attachment to the tooth.

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