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COMBINATION DENTAL APPLIANCE DEFINING A TRACTION
INSTRUMENT AND DETACHABLE CLAMPING
BLOCKS FOR MATRIX BANDS
Filed Aug. 31, 1959

2,964,847

FIG. 1.

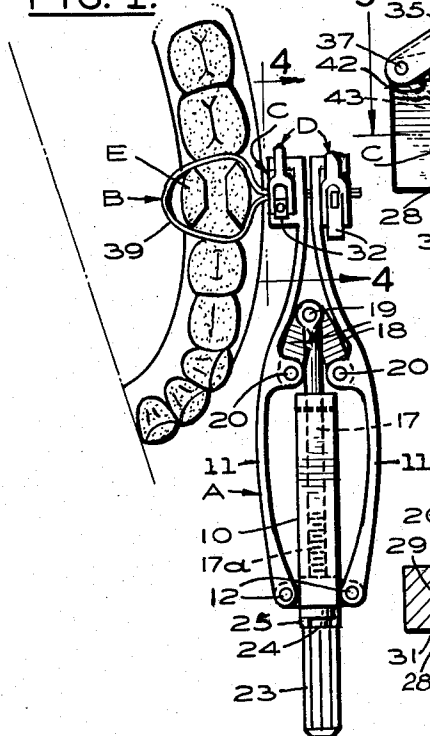


FIG. 4.

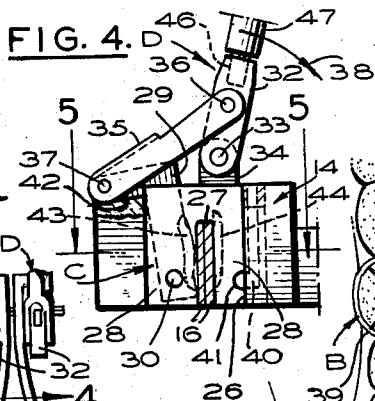


FIG. 2.

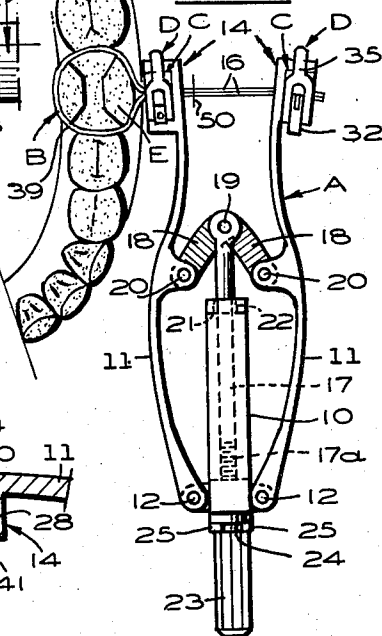


FIG. 5.

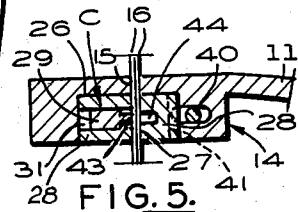


FIG. 3.

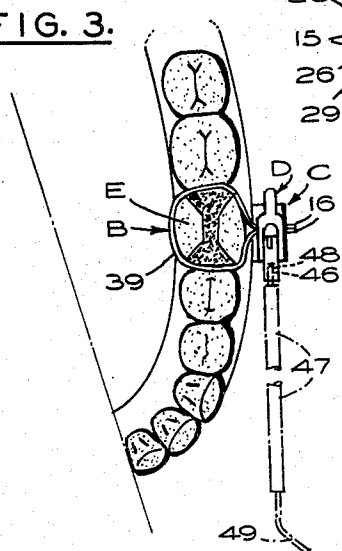
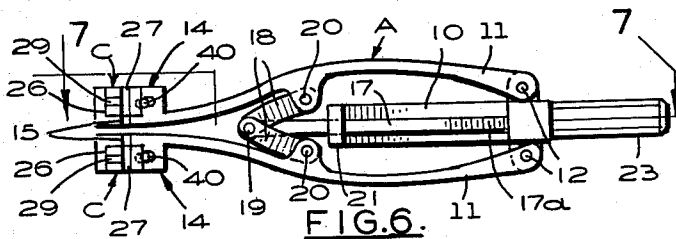


FIG. 6.

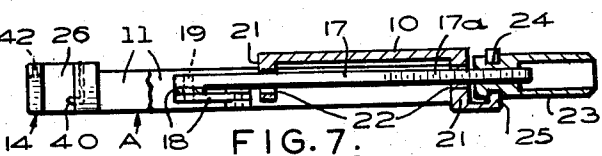


FIG. 7.

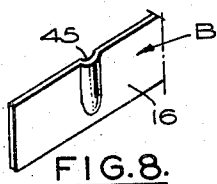


FIG. 8.

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COMBINATION DENTAL APPLIANCE DEFINING A TRACTION INSTRUMENT AND DETACHABLE CLAMPING BLOCKS FOR MATRIX BANDS

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6 Claims. (Cl. 32-63)

The present invention relates to improvements in a combination dental appliance defining a traction instrument and detachable clamping blocks for matrix bands. It consists of the combination, construction, and arrangement of parts, as hereinafter described and claimed. This invention has particular reference to improvements over my copending application on a "Combination Dental Instrument Defining a Matrix Band Retainer and Clamping Block for the Band," Serial No. 798,003, which was filed in the United States Patent Office on March 9, 1959.

An object of my invention is to provide a traction instrument having a pair of arms mounted for movement toward and away from one another, each arm having a clamping block detachably secured thereto and movable therewith. These clamping blocks are slotted so that overlapped end portions of a looped matrix band may be guided therethrough, with the loop of the matrix band extending from the traction instrument for encircling a tooth. Moreover, each clamping block is provided with releasable clamping means independently operable for selectively anchoring the block to the matrix band.

After the matrix band has been drawn into firm embracement with the axial contour of a banded tooth, by spreading the arms of the traction instrument apart, the matrix band may be cut between the two clamping blocks. Thus one of the clamping blocks may remain on the matrix band to retain the latter around the tooth, while the other clamping block and the traction instrument may be withdrawn from the patient's mouth. Thus the operator is assured that the band is securely held in the originally adjusted position; and, at the same time, the operator is provided with greater access, improved visibility, less bulk of equipment, and a greater degree of comfort is provided to the patient.

Another object of the invention is to provide a clamping block which is positive in action, quickly locked in position, and most easily actuated with the minimum of effort on the part of the operator. The clamping block may be actuated in such a manner as to positively prevent it from slipping relative to the matrix band.

Other objects and advantages will appear as the specification continues. The novel features of the invention will be set forth in the appended claims.

Drawing

For a better understanding of the invention, reference should be had to the accompanying drawing, forming part of this specification, in which:

Figure 1 is a top plan or occlusal view of my combination dental appliance defining a traction instrument and detachable clamping blocks for matrix bands, disclosing the instrument in closed position, with a band being applied around a tooth;

Figure 2 is a view similar to Figure 1, but illustrating the arms of the traction instrument as being spread apart sufficiently for firmly constricting the matrix band against the tooth;

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Figure 3 shows the loop of the matrix band as being secured around the tooth by one of the clamping blocks, the other clamping block and the traction instrument having been removed from the patient's mouth;

Figure 4 is an enlarged fragmentary vertical sectional view taken along the plane 4-4 of Figure 1;

Figure 5 is a horizontal sectional view taken along the plane 5-5 of Figure 4;

Figure 6 is a bottom plan view of the traction instrument, disclosing the latter as carrying a pair of the clamping blocks;

Figure 7 is a longitudinal sectional view taken along the plane 7-7 of Figure 6, the clamping blocks being omitted; and

Figure 8 is a fragmentary perspective view of the matrix band, disclosing a crimp as being formed therein.

While I have shown only the preferred form of my invention, it should be understood that various changes, or modifications, may be made within the scope of the annexed claims without departing from the spirit thereof.

Detailed description

Referring to the drawing in detail, I have illustrated a traction instrument which is designated generally at A. This instrument defines a longitudinally extending bar 10 having a pair of arms 11 swingably secured thereto, by pivot pins 12, so that the outer ends of the arms may be moved toward and away from one another.

It will be noted that each arm 10 has a free end provided with a retainer head 14, each head being fashioned with a transverse slot 15 (see Figures 5 and 6) through which overlapped end portions 16 of a looped matrix band B are adapted to slide.

For the purpose of moving the arms 11 toward and away from one another, I have provided a rod 17 that extends longitudinally of the traction instrument A. The forward end of this rod has the inner ends of a pair of links 18 swingably secured thereto by a pivot pin 19. The outer ends of these links are attached by pivot pins 20 to the arms 11. The bar 10 is formed with lugs 21 at its front and rear ends, each lug being provided with an opening 22 through which the rod 17 extends with freedom of axial movement (see Figure 7).

In order to move the rod 17 axially, and thereby swing the arms 11 toward and away from one another, I have provided a sleeve 23 through which the rear threaded end 17a of the rod is screwed. This sleeve is fashioned with an annular groove 24 therein for receiving a U-shaped fork 25 provided on the rear lug 21 (see Figure 7). The fork 25 will hold the sleeve 23 against longitudinal movement, while allowing the sleeve to be rotated in either direction. It is obvious that when the sleeve 23 is rotated in one direction, the retainer heads 14 will be spread apart, while an opposite rotation of this sleeve will move the retainer heads toward one another.

It will be observed that I have provided a pair of clamping blocks C (see Figures 4, 5 and 6) which are adapted to slide into vertical recesses 26 fashioned in the retainer heads 14. Both clamping blocks C are identical in construction, and each has a transverse slot 27 which is adapted to register with the transverse slot 15 in the retainer head 14 to which the particular clamping block C is applied (see Figures 5 and 6). The slot 27 of each clamping block is adapted to receive the overlapped end portions 16 of the matrix band B. Obviously, the transverse slot 27 of each clamping block provides a pair of fingers 28 (see Figure 4) that are adapted to straddle the matrix ends 16.

In order to releasably and selectively clamp the clamping blocks C upon the end portions 16 of the matrix band, each block is provided with an L-shaped clamping bar 29. Each of the latter is disposed adjacent to, and on the distal

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edge of, the transverse slot 27 and has its lower end swingably secured near the gingival border of the retaining block by a pivot pin 30 to one of the fingers 28 of the clamping block. The bar 29 is swingable toward the other finger 28 of the block C, so as to clamp the overlapped end portions 16 of the matrix band therebetween. In Figure 5, the bar 29 is shown as being accommodated in a recess 31 so as to permit the bar to be swung back and forth.

For the purpose of actuating the clamping bars 29, I have provided each clamping block C with a self-locking toggle arrangement designated generally at D. Each toggle arrangement D includes a relatively short operating lever 32 having one end thereof swingably secured by a pivot pin 33 to a lug 34 that projects from the clamping block (see Figure 4). Moreover, each toggle arrangement includes a link 35 having one of its ends swingably secured by a pivot pin 36 to the operating lever 32, the other end of this link being swingably secured by a pivot pin 37 to the upper end of the clamping bar 29.

It will be apparent from Figure 4 that when the operating lever 32 is raised, as shown in this view, the clamping bar 29 will be positioned away from the overlapped end portions 16 of the matrix band B; however, when the operating lever 32 is swung downwardly, as suggested by the arrow 38, the bar 29 will be clamped against the overlapped end portions of the matrix band.

As shown in Figures 1 to 3, inclusive, the loop 39 of the matrix band B projects beyond one of the clamping blocks C for encircling a selected tooth E to be restored or filled. Obviously, one of the clamping blocks C is adapted to be arranged adjacent to the loop 39 of the matrix band. When the operating levers 32 are swung for causing the clamping bars 29 to grip the overlapped end portions 16 of the matrix bands, the levers 32 will be arranged substantially parallel with the occlusal plane of the banded tooth E. Thus the levers 32 will not present any discomfort to the patient, and will be out of the way of the operator; and at this time the toggle arrangements D will be locked.

As previously mentioned, the clamping blocks C are detachably connected to the retainer heads 14. Each clamping block may be removed laterally from its respective retainer head 14, since the vertical recesses 26 open laterally and will permit such removal. Each retainer head 14 is provided with a resilient detent 40 (see Figures 4, 5 and 6), which is disposed to engage with a laterally extending depression 41 formed in the clamping block C associated with this particular head to thereby removably hold the clamping block in the vertical recess 26. The depression 41 extends entirely across the block C to permit lateral withdrawal of the block from the retainer head 14.

Moreover, each retainer head 14 is provided with an occlusal notch 42 (see Figures 4 and 7), which is disposed to frictionally receive part of the link 35 of the toggle arrangement D, when the clamping bar 29 is released from the matrix band ends 16, thus aiding in holding the block in place in the retainer head. However, this part of the link 35 is removable out of engagement with the notch 42, when the toggle arrangement is moved into locked position, whereby the block C may be disengaged laterally from the retainer head 14. Both retainer heads 14 are provided with notches 42.

Of course, the overlapped end portions 16 of the matrix band B should be held against slippage when the clamping bars 29 are engaged therewith. For this reason, each bar 29 has a bi-bevelled male die section or tongue 43 which coact with a female counter-die section or groove 44 in the other finger 28 to provide a crimp 45 in the matrix band B (see Figures 4 and 5). The female counter-die section 44 is positioned to have the crimp 45 forced therein by the male die section 43, when the clamping bar 29 is moved toward the other finger 28. The bi-bevelled mesial edge of the die or tongue 43

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actually crosses the slot 27 in which the ends 16 of the matrix band B extend. Obviously, the crimp 45 will positively prevent the matrix band ends 16 from slippage relative to the clamping blocks C, and this is an important structural feature.

In Figures 3 and 4, I show the operating lever 32 of each toggle arrangement D as being provided with a socket 46, the latter being adapted to have a handle tool 47 inserted therein for operating the toggle arrangement. Of course, the handle tool 47 may be removed from the patient's mouth, when its use is not required. As suggested in Figure 3, one end 48 of the tool may be made straight, while the opposite end 49 may be curved.

The specially designed form of the arms 11 of the traction instrument A enclosing the operating mechanism (rod 17 and links 18) results in a well balanced, form-fitting instrument, which may be easily held in the palm of the operator's hand, and greatly facilitates the placement operation of the matrix band B over the prepared tooth E.

Moreover, the flat bar 10 of the traction instrument A serves as a guide in orienting the instrument at all times, and facilitates placement of the ensemble in proper position on the tooth, and in the carrying of the matrix band B in a fully controlled, full-view, insertion-plane over the gingival floor areas of the prepared tooth E to be banded and filled.

The specially designed vertical recesses 26 in the retainer heads 14, together with the detents 40, not only hold the clamping blocks C in their proper positions during the application of the matrix band B around the tooth E, but further keep the clamping blocks in this position until the traction instrument A tightens the matrix band against the tooth.

When constricting the matrix band B around the tooth E, the toggle arrangement D of the inner clamping block, which is disposed adjacent to the loop 39 of the band, should be unlocked; while the toggle arrangement of the outer clamping block, which is remote from the loop 39, should be locked (see Figure 1). Thus, as the arms 11 are spread apart by turning the sleeve 23 (see Figure 2), the overlapped end portions 16 of the matrix band will be drawn through the inner clamping block. After the matrix band has been drawn into firm contact with the axial contour of the banded tooth E, the toggle arrangement D of the clamping block C adjacent to the loop 39 should be locked.

Now the matrix ends 16 should be cut close to the inner retainer head 14, as suggested by the line 50 in Figure 2. This will permit the operator to remove the traction instrument A and the outer or remote clamping block C from the patient's mouth, leaving only the loop 39 of the matrix band and the inner clamping block C, as suggested in Figure 3. It will thus be seen that a minimum of equipment remains in the patient's mouth, thereby liberating the operator of the bulky equipment which has heretofore obstructed both the operator's freedom of vision and working space.

Obviously, the toggle arrangement D of the clamping block C then remaining in the patient's mouth may be easily unlocked by using the handle tool 47. This remaining clamping block and the matrix band may be removed with facility and ease.

I claim:

1. In a combination dental appliance defining a traction instrument and detachable clamping blocks for matrix bands: a traction instrument having a pair of arms mounted for movement toward and away from one another; a pair of clamping blocks, each being detachably connected to one of the arms to move therewith; each clamping block being provided with releasable clamping means operable for independently and selectively anchoring the block to overlapped end portions of a looped matrix band; one of the clamping blocks being adapted

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to be arranged adjacent to the loop of the matrix band, with the loop projecting beyond this clamping block for encircling a patient's tooth; the traction instrument having means operable for spreading the arms apart to thereby constrict the loop of the matrix band around the tooth, when the clamping means on the block adjacent to the loop is released, and the other clamping block is anchored by its clamping means to the overlapped end portions of the matrix band.

2. The combination dental appliance defining a traction instrument and detachable clamping blocks for matrix bands, as defined in claim 1; and in which the clamping means of each clamping block is provided with means operable to form a crimp in the overlapped end portions of the matrix band, thereby assuring positive anchoring of the matrix band to the clamping blocks.

3. In a combination dental appliance defining a traction instrument and a detachable clamping block for matrix bands; a traction instrument having an arm; a clamping block detachably connected to the arm to move therewith; the clamping block being provided with releasable clamping means operable for anchoring the block to overlapped end portions of a looped matrix band, with the loop of the matrix band projecting from the block for encircling a patient's tooth; the traction instrument having means thereon operable for constricting the loop of the matrix band around the tooth, when the clamping means on the block is released; the releasable clamping means of the block being provided with means operable to form a crimp in the overlapped end portions of the matrix band, thereby assuring positive anchoring of the matrix band to the clamping block.

4. In a combination dental appliance defining a traction instrument and a detachable clamping block for matrix bands: a traction instrument having an arm provided with a retainer head; the retainer head being fashioned with a vertical recess that opens to a lateral side of the retainer head; a clamping block disposed in said recess for removal from said lateral side of the retainer head; the clamping block being provided with releasable clamping means operable for anchoring the block to overlapped end portions of a looped matrix band, with the loop of the matrix band projecting from the block for encircling a patient's tooth; the traction instrument having means thereon operable for constricting the loop

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of the matrix band around the tooth, when the clamping means on the block is released; the retainer head being provided with a notch which is disposed to receive a part of the releasable clamping means, when the clamping means is released from the matrix band, thus aiding in holding the block in place in the vertical recess of the retainer head; said part of the releasable clamping means being movable out of engagement with the notch, when the clamping means is moved into a position to anchor the block to the matrix band, whereby the block may be disengaged laterally from the retainer head.

5. A clamping block for use with a traction instrument in securing a looped matrix band around a tooth and comprising: a slotted block defining a pair of spaced fingers adapted to straddle overlapped end portions of the looped matrix band; the fingers defining a slot therebetween through which the end portions of the band may be pulled; a clamping bar disposed adjacent to the slot and having one end of the bar swingably secured to one of the fingers; the bar being swingable toward the other finger so as to clamp the overlapped end portions of the band therebetween; releasable means operable for swinging the bar into clamping relation with the matrix band; the bar having a male die section thereon which is disposed to form a crimp in the overlapped end portions of the matrix band, when the bar is swung into clamping relation with the matrix band; and said other finger of the clamping block being fashioned with a female counter-die section, which is positioned to have the crimp forced therein by the male die section of the clamping bar, when the latter is moved toward said other finger.

6. A clamping block for use with a traction instrument in securing a looped matrix band around a tooth, as defined in claim 5; and in which the releasable clamping means for swinging the clamping bar includes a self-locking toggle arrangement; the latter having an operating lever provided with a socket, the socket being adapted to have a handle tool inserted therein for actuating the toggle arrangement.

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