

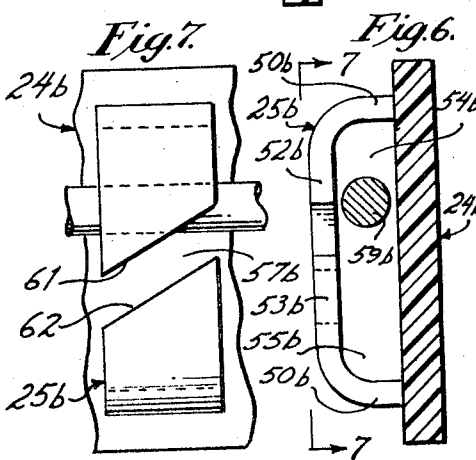
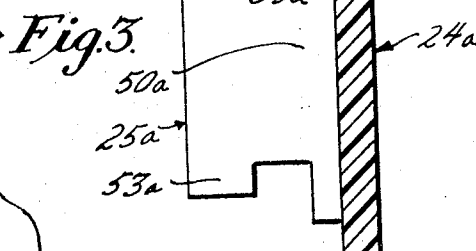
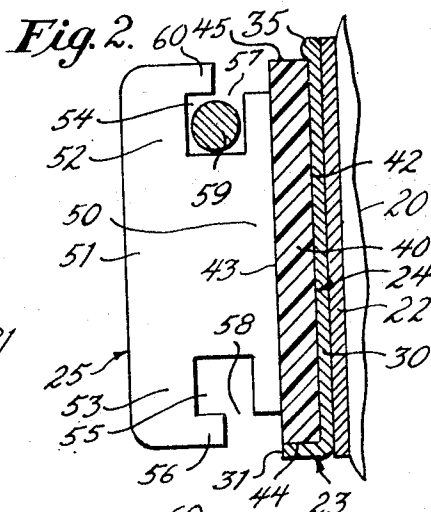
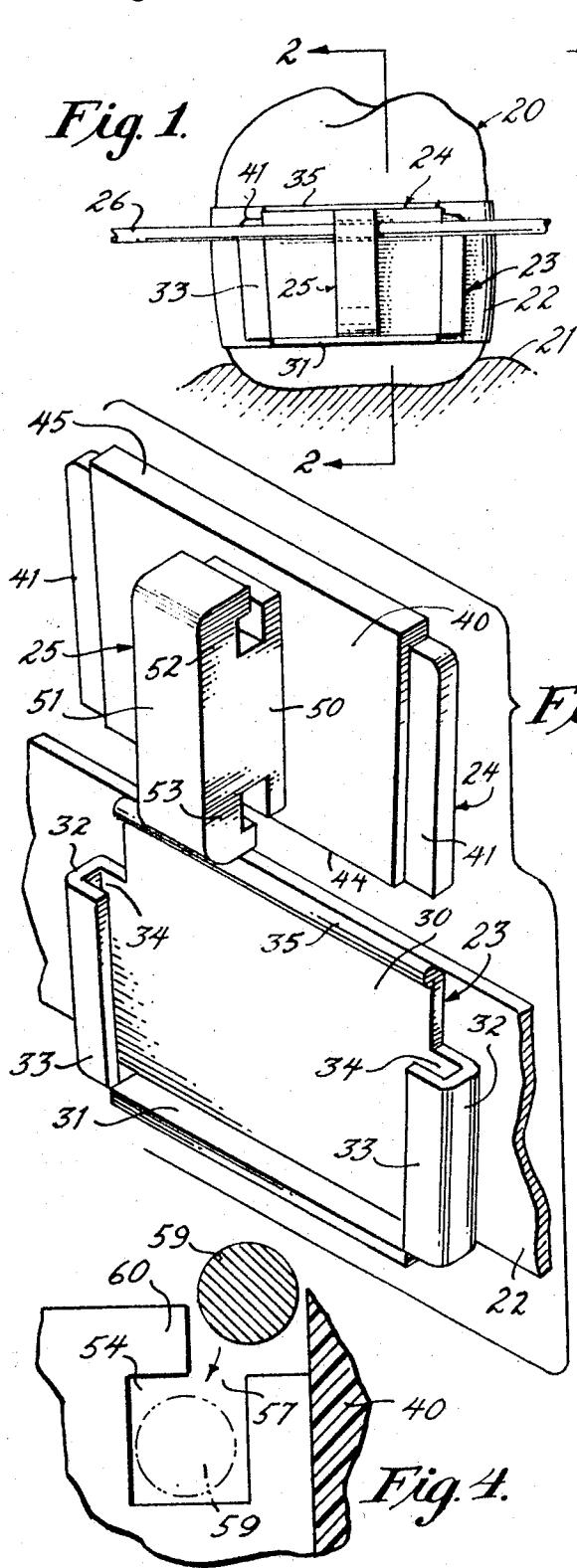
Sept. 2, 1969

E. SILVERMAN ET AL
ORTHODONTIC APPLIANCE

3,464,113

Filed Aug. 3, 1966

2 Sheets-Sheet 1



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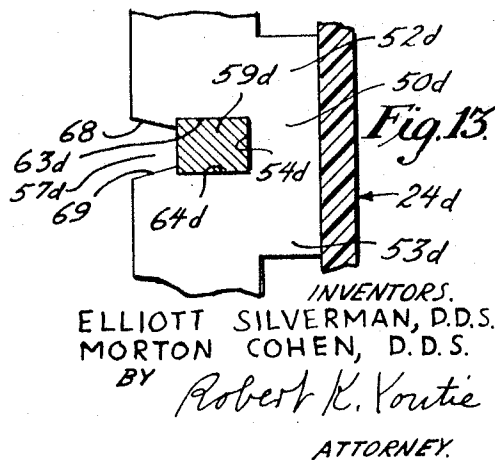
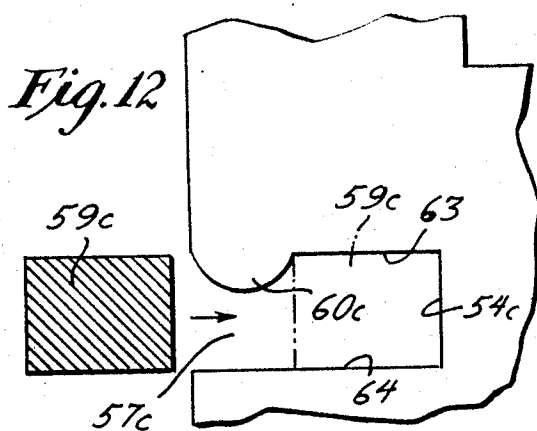
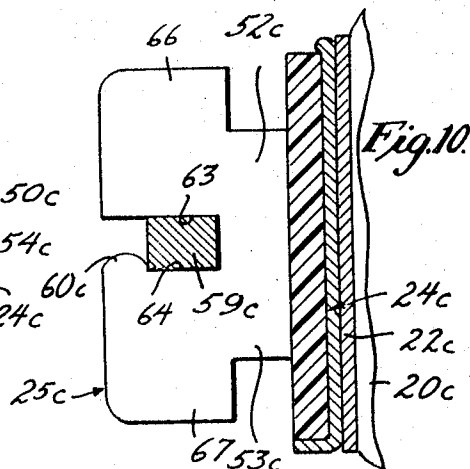
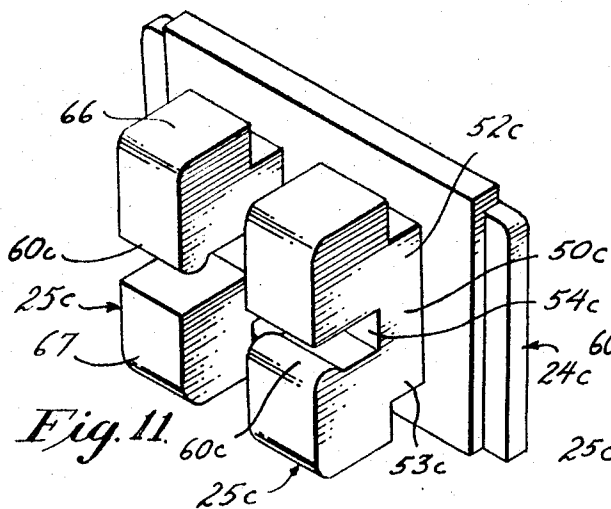
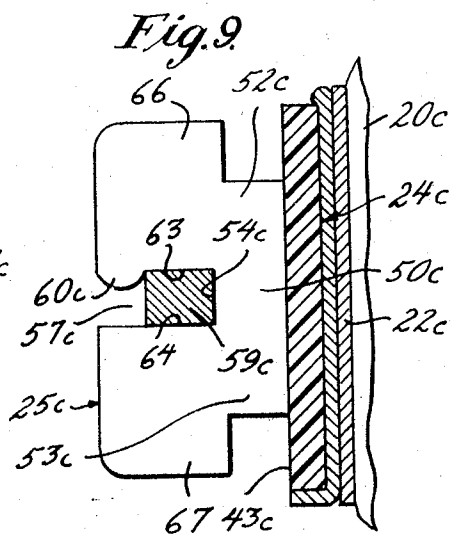
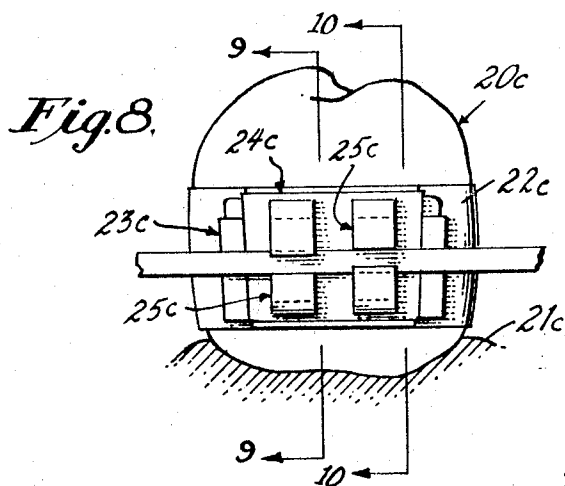
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ORTHODONTIC APPLIANCE

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Int. Cl. A61c 7/00

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10 Claims

ABSTRACT OF THE DISCLOSURE

This invention is essentially concerned with an orthodontic appliance wherein a substantially rigid carrier is removably attached to a tooth, and a bracket is provided on the front side of the carrier which includes an attachment part fixed to the carrier and a receiver part configured to define a laterally extending thru opening for slidably receiving an orthodontic wire and a slot extending laterally across the receiver and communicating with the opening, the slot being configured of a width less than wire thickness for snap engagement of the wire through the slot.

This invention relates generally to orthodontic appliances, and is especially concerned with unique improvements in orthodontic brackets and associated structures.

The instant invention is related to our copending patent application Ser. No. 551,022, filed May 18, 1966 and now Patent No. 3,421,221 issued Jan. 14, 1969, and is a continuation-in-part thereof.

The instant invention contemplates the provision of a uniquely advantageous orthodontic bracket which greatly reduces the orthodontist's time previously required in applying, adjusting and removing orthodontic wires.

It is a particular object of the present invention to provide orthodontic brackets of the type described for utilization in practicing both the light-wire and edgewise-wire techniques.

It is still a further object of the present invention to provide orthodontic bracket constructions having the advantageous characteristics mentioned in the preceding paragraphs, which constructions are extremely simple, economical to manufacture, durable and reliable throughout a long useful life, and which can be sold at a reasonable price.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, which will be exemplified in the construction hereinafter described, and of which the scope will be indicated by the appended claims.

In the drawings:

FIGURE 1 is a front elevational view showing an orthodontic appliance constructed in accordance with the teachings of the present invention in position on a patient's tooth;

FIGURE 2 is a sectional elevational view taken generally along the line 2—2 of FIGURE 1;

FIGURE 3 is an exploded perspective view illustrating the orthodontic appliance of FIGURES 1 and 2;

2

FIGURE 4 is a partial sectional elevational view similar to FIGURE 2, but illustrating the wire-applying technique;

FIGURE 5 is a partial sectional elevational view similar to FIGURE 2 illustrating a slightly modified embodiment of the present invention;

FIGURE 6 is a sectional elevational view similar to FIGURE 5 illustrating a further embodiment of the instant invention;

FIGURE 7 is a front plan view taken generally along the line 7—7 of FIGURE 6;

FIGURE 8 is a front elevational view similar to FIGURE 1, but illustrating an embodiment of the instant invention utilizing the edgewise orthodontic technique;

FIGURE 9 is a sectional elevational view taken generally along the line 9—9 of FIGURE 8;

FIGURE 10 is a sectional elevational view taken generally along the line 10—10 of FIGURE 8;

FIGURE 11 is a top perspective view illustrating a carrier-and-bracket assembly of the embodiment of FIGURES 8-10;

FIGURE 12 is an enlarged sectional elevational view similar to FIGURE 9, illustrating the wire-insertion technique for use therewith; and

FIGURE 13 is a sectional elevational view similar to FIGURES 9 and 10 showing another slightly modified embodiment of the present invention.

Referring now more particularly to the drawings, and specifically to FIGURES 1-4 thereof, a patient's tooth is seen in FIGURE 1, there being designated 20, extending from the gum line 21. A band 22 is snugly circumposed about the tooth 20, and a socket or receptacle 23 is attached to the band. The socket 23 receives a carrier 24 carrying a bracket 25. A wire 26 is held by the bracket 25, the wire being of generally circular cross section as employed in the light-wire technique.

The socket 23 may best be seen in FIGURES 2 and 3, as including a back wall 30, generally of rectangular configuration and secured in facing engagement with the band 22, as by welding or otherwise. Along the lower edge of the back wall 30 is a lower end wall 31 outstanding forwardly from the back wall. While the end wall 31 is referred to herein for clarity as a lower end wall, being illustrated in FIGURE 1 as on a lower tooth 20, it is, of course, appreciated that the end wall 30 would be an upper end wall on an upper tooth.

Projecting forwardly from opposite sides of the back wall 30, and extending generally vertically therealong, are a pair of side walls 32, each adjacent to a respective end of the lower end wall 31. Provided on the forward edges of side walls 32 are intumed flanges or lips 33, each combining with the associated side wall 32 and adjacent facing portion of back wall 30 to define vertically extending, facing spaced grooves 34. Along the upper edge of the back wall 30 is a forward protuberance or lip 35, which may be formed by rolling an upper edge portion of the back wall, or otherwise as desired. In particular, the socket 23 may be integrally fabricated of a single sheet of metal, by suitable stamping and bending procedures, or fabricated by other desired means.

The carrier 24 may include a generally rectilinear plate or block 40 having outstanding wings 41 at its side edges. The carrier block 40 is conformably engageable in the socket 23, with the wings 41 each received in a respective groove 34. In this condition, best seen in FIGURES 1

and 2, the rear side 42 of the carrier block may be in facing engagement with the socket backplate 30, and the front side 43 of the carrier block may be substantially flush with the front surfaces of the flanges 33. Further, the lower edge 44 of the carrier block 40 may seat on the end wall 31 of the socket, and the upper carrier-block edge 45 may be engaged beneath the socket lip or protuberance 35.

In practice, the carrier 24 may be integrally fabricated of any suitable material, say plastic, and possessed of inherent resilience for insertion of the wings 41 into respective grooves 34 and snap engagement of the upper block edge 45 downward past the protuberance 35. Thus, the carrier 24 is firmly seated in the socket 23, and may not be removed except by deliberate and positive procedures.

On the front side 43 of the carrier block 40 is the bracket 25. The bracket may be integrally formed with the carrier 24, say of resilient plastic, as by injection molding, or other suitable means. As formed, the bracket 25 may include an attachment part 50 projecting forwardly from a central region of the carrier plate 40, integral therewith. The attachment part 50 may be of generally rectangular, or other suitable configuration.

Extending from the attachment part 50 is a receiver part 51, which may include a pair of arms 52 and 53 respectively extending upwardly and downwardly from the attachment part, each spaced forwardly from the front side 43 of the carrier plate 40. The receiver arms 52 and 53, by their respective spacing from the carrier block 40 serve to define upper and lower receiver openings 54 and 55. Thus, the space between carrier plate 40 and upper receiver arm 52 defines the receiver opening 54 which extends laterally of the carrier and opens toward opposite carrier sides. Similarly, the lower receiver opening 55 is defined between the lower receiver arm 53 and carrier plate 40 and opens in opposite directions toward opposite carrier sides.

On the distal ends of receiver arms 52 and 53 are formed inward protuberances or detents 60 and 56, respectively, which extend inward or rearward toward and terminate short of the front carrier side 43. Thus, the space 57 between upper receiver arm detent 60 and carrier plate 40 provides a passageway for entry to and removal from the upper receiver opening 54, while the space 58 between lower receiver arm detent 56 and carrier plate 40 provides a passageway for communication with the lower receiver opening 55. The entry passageways 57 and 58 have their opposite ends opening laterally toward opposite sides of the carrier plate 40 while communicating vertically with their respective adjacent receiver openings 54 and 55.

By this construction, an orthodontic wire 59, say of generally circular cross section as employed in light-wire techniques, may be quickly and easily inserted laterally into and removed from a desired receiver opening. More particularly, the spacing of the communicating passageways 57 and 58, as between the detents 60 and 56 and carrier front side 43, is advantageously slightly less than the diameter of wire 59, while the spacing of receiver openings 54 and 55 between arms 52 and 53 and the carrier plate front side is advantageously slightly greater than the wire diameter. By the inherent resilience of arms 52 and 53, the latter may be deflected for snap engagement of the wire 59 past the detent 60 and into the opening 54, so as to be effectively retained therein against inadvertent removal. Of course, the wire 59 may be optionally inserted upward through lower passageway 58 into opening 55, if desired. Also, the lower arm 53 may be employed for ligating the wire 59, if desired, and conversely should the wire be engaged in the lower receiver opening.

In the embodiment shown in FIGURE 5, a carrier 24a is substantially identical to the carrier 24 of the first embodiment, and the bracket 25a is essentially similar to

the bracket 25, but slightly modified. In particular, the bracket 25a includes an attachment part 50a projecting from the front side of the carrier 24a and a receiver arm 52a extending in only one direction from the attachment part. The receiver arm 52a is provided with an in-turned detent 60a on its distal end for snap engagement past a received wire 59a. Extending from the attachment part 50a oppositely with respect to the receiver arm 52a may be a stud 53a, for use in ligating, if desired. The stud 53a may be eliminated, if desired.

Referring now to the embodiment of FIGURES 6 and 7, a carrier 24b may be essentially similar to the carrier 24, and the bracket 25b is a slight variation of the bracket 25.

More particularly, the bracket 25b includes a pair of vertically spaced attachment parts 50b projecting forwardly from the carrier 24b, and may be formed integral therewith. From the outer ends of the upper and lower attachment parts 50b may extend a pair of upper and lower receiver arms 52b and 53b. The upper arm 52b extends downward toward and terminates short of the lower arm 53b which extends upward toward the upper arm. Thus, the upper arm extends downwardly in forwardly spaced relation with respect to the carrier 24b and combines with the latter to define in the space therebetween a receiver opening 54b extending laterally and having its opposite ends opening toward opposite sides of the carrier. The lower arm 53b is similarly disposed in forwardly spaced relation with respect to the carrier 24b and combines with the latter to define a lower receiver opening 55b extending laterally and opening toward opposite sides of the carrier.

The terminal edges 61 and 62 of the upper and lower receiver arms 52b and 53b may be disposed in generally parallel, facing spaced relation; and, as best seen in FIGURE 7 may extend diagonally with respect to the receiver arms. Thus, the space 57b between the receiver arm ends 61 and 62 defines a passageway communicating with the receiver openings 54b and 55b, the passageway 57b extending generally laterally and opening in laterally opposite directions toward opposite sides of the carrier 24b. Thus, an orthodontic wire 59b may be passed laterally through the passageway 57b into one or the other of receiver openings 54b or 55b. If desired, the space between end edges 61 and 62 may be slightly less than the wire diameter for snap engagement therethrough. However, it is preferred that the receiver openings 54b and 55b be at least slightly greater in forward-and-rearward dimension than the wire diameter for free reception thereof.

Referring now to FIGURES 8-12, and particularly to FIGURE 8, a patient's lower tooth is there generally designated 20c, extending upward from the gum line 21c and provided with a girdling band 22c. Fixedly secured by any suitable means to the band 22c, on the front side of the tooth 20c is a socket or receptacle 23c, and a carrier 24c is engaged in the socket and provided on its front side with a pair of laterally spaced brackets 25c.

The socket 23c and carrier 24c may be substantially identical to those previously described, and the brackets 25c are similar, but slightly modified with respect to the previously described brackets.

The embodiment of FIGURES 8-12 illustrates the edgewise orthodontic technique, wherein it is conventional to employ a pair of brackets on a single tooth. However, it is appreciated that a greater or lesser number may be employed, if desired.

The leftward bracket 25c, as seen in FIGURE 8, is best illustrated in FIGURES 9 and 11, as including an attachment part 50c, which may be formed integrally with the carrier 24c, say of plastic material having a desired resiliency, as by injection molding or the like. The attachment part 50c may be of generally rectilinear configuration and project forwardly from the front side 43c of the carrier 24c. Projecting from the attachment part 50c are a pair of upper and lower carrier arms 52c and 53c, arranged in vertically spaced relation and integral with the

attachment part. More specifically, the upper and lower receiver arms 52c and 53c may extend in substantial parallelism, with their inner faces 63 and 64 substantially parallel. On the distal or forward end of upper receiver arm 52c may be provided a protuberance or detent 60c depending toward and terminating short of the upper surface 64 of lower arm 53c.

An additional pair of upper and lower arms 66 and 67 may project from the forward ends of respective receiver arms 52c and 53c. That is, the upper arm 66 projects upwardly from the forward end of upper receiver arm 52c, while the lower arm 67 projects downwardly from the forward end of lower receiver arm 53c.

The rightward bracket 25c as seen in FIGURE 8 may be substantially identical to the leftward bracket, see FIGURE 10, but inverted so that the lower receiver arm 53c is provided at its forward end with an upstanding protuberance or detent 60c projecting toward and terminating short of the lower surface 63 of upper receiver arm 52c. Thus, the leftward bracket 25c is provided with a downwardly projecting upper detent 60c, while the rightward bracket 25c is provided with an upwardly projecting lower detent 60c.

In practice of the edgewise orthodontic technique, a noncircular orthodontic wire 59c is employed, say of generally rectangular cross-sectional configuration. The wire dimensions are such that the wire may be forcibly engaged between the receiver arms 52c and 53c by resilient deflection thereof sufficient to snap the wire rearward or inward past the detents 60c. In this condition the wire 59c is effectively held against rotation, as well as inadvertent removal from the receiving brackets. The insertion procedure is illustrated in FIGURE 12 for the leftward bracket 25c. If desired, the additional arms 66 and 67 may be employed for retaining ligatures tied about the wire.

Here again, as in the first-described embodiment, the space or clearance between each detent 60c and the adjacent portion of the opposite arm is less than the corresponding cross-sectional dimension of the wire 59c, while the space or clearance between receiver-arm surfaces 63 and 64 may be slightly greater than the cross dimension of the wire. If desired, the edgewise wire 59c may be a snug fit between the receiver arm surface 63 and 64, to eliminate the need for ligating.

Thus, as in the previously described embodiments, the brackets 25c are each provided with a receiver opening 54c defined between the receiver arms 52c and 53c, and extending laterally with respect to the carrier 24c, opening toward opposite sides thereof. Further, each bracket 25c is provided with a passageway 57c defined between the detent 60c and adjacent portion of the opposite receiver arm communicating with the receiver opening 54c. The passageway 57c opens laterally toward opposite sides of the carrier 24c for lateral wire insertion and withdrawal therethrough. If desired, a pair of detents may be provided projecting from both arms 52c and 53c.

A further embodiment is shown in FIGURE 13, a carrier there being generally designated 24d, which may be identical to the carrier 24c. A bracket 25d is carried on the front side of the carrier 24d, and may be formed integral therewith of suitable resilient material, such as plastic. The carrier 25d is for use in practice of the edgewise orthodontic technique, and similar in many respects to the brackets 25c.

More particularly, the bracket 25d includes an attachment part 50d projecting from the front side of the carrier 24d, and a pair of vertically spaced receiver arms 52d and 53d projecting forwardly from the attachment part. The receiver arms 52d and 53d may include facing surfaces 63d and 64d in substantial parallelism with each other for defining therebetween a receiver opening 54d configured to nonrotatably receive a noncircular orthodontic wire 59d.

The receiver arms 52d and 53d may each be provided

at their outer ends with a generally triangular tooth, as at 68 and 69, which teeth project toward and terminate short of each other. The teeth 68 and 69 are beveled to define therebetween an inwardly tapering passageway 57d communicating with the receiver opening 54d. Thus, the orthodontic wire 59d may be engaged through the passageway 57d, riding on and reflecting apart the beveled teeth or detents 68 and 69 to snap beyond the teeth into the receiver opening 54d.

If desired, a single such beveled tooth 68, 69 may be employed on only one of the receiver arms 52d and 53d.

From the foregoing, it is seen that the present invention provides an orthodontic bracket construction which fully accomplishes its intended objects and is well adapted to meet practical conditions of manufacture, application and use.

What is claimed is:

1. An orthodontic appliance comprising a substantially rigid carrier adapted for removable attachment to a tooth and having a front side adapted to face forwardly away from said tooth, and a bracket carried on the front side of said carrier, said bracket comprising an attachment part fixedly secured to said carrier, and a receiver part of resiliently deflectable material extending from said attachment part and defining a laterally extending thru opening for slidably receiving therethrough a laterally extending orthodontic wire, said receiver part being formed with a slot extending generally laterally thereacross and communicating with said receiver opening for passing orthodontic wire laterally into and out of said opening, said slot being of a width less than the thickness of said wire for resilient deflection of said receiver upon lateral wire movement into and out of said opening.

2. An orthodontic appliance according to claim 1, said receiver part comprising an arm extending generally vertically in one direction from said attachment part in forwardly spaced relation with respect to said carrier front side, and a detent on the distal end of said arm projecting toward and spaced from said carrier, the space between said arm and carrier defining said opening and being at least equal to the diameter of a received orthodontic wire, and the space between said detent and carrier defining said slot and being less than the wire diameter, for snap engagement of said wire past said detent into sliding reception in said opening.

3. An orthodontic appliance according to claim 2, in combination with a second arm extending generally vertically in the other direction from said attachment part in forwardly spaced relation with respect to said carrier front side, and a second detent on the distal end of said second arm projecting toward and spaced from said carrier, the space between said second arm and carrier defining a second opening and being at least equal to the diameter of an orthodontic wire and the space between said second detent and carrier defining a second slot and being less than the wire diameter, for snap engagement of wire past said second detent.

4. An orthodontic appliance according to claim 1, in combination with a socket adapted to be fixed to a tooth and comprising an end wall projecting outwardly from an adjacent tooth, a pair of side walls projecting outwardly from an adjacent tooth in facing spaced relation with respect to each other and adjacent to opposite ends of said end wall, and intumed flanges on the outer edges of said side walls, said side walls and flanges serving to receive opposite marginal portions of a carrier inserted toward said end wall.

5. An orthodontic appliance according to claim 4 in combination with a forwardly projecting lip spaced from said end wall for snap engagement beyond said carrier to releasably retain the latter in said socket.

6. An orthodontic appliance according to claim 1, said attachment part comprising a pair of vertically spaced forward projections on said carrier, and said receiver part comprising a pair of arms extending from respective pro-

7

jections toward each other in spaced relation forwardly of said carrier a distance at least equal to the thickness of said wire, said arms terminating in spaced ends defining said passageway.

7. An orthodontic appliance according to claim 6, said arm ends extending in parallelism with each other diagonally of said arms, to resist inadvertent withdrawal of a received wire.

8. An orthodontic appliance according to claim 1, said receiver part comprising a pair of spaced forwardly projecting arms, and a detent on the forward end of at least one arm projecting toward the other arm, the space between said arms being at least equal to the cross-sectional area of a received orthodontic wire and the space between said detent and other arm being less than a transverse dimension of the wire, for snap engagement of the wire past said detent.

9. An orthodontic appliance according to claim 8, said arms being generally parallel for nonrotative reception of a wire.

10. An orthodontic appliance according to claim 9, in

8

combination with an additional pair of arms extending respectively from the forward ends of said first-mentioned arms in opposite directions for retaining ligatures.

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