Sept. 2, 1969 E. SILVERMAN ET AL 3,464,112

ORTHODONTIC APPLIANCE

Filed June 30, 1967

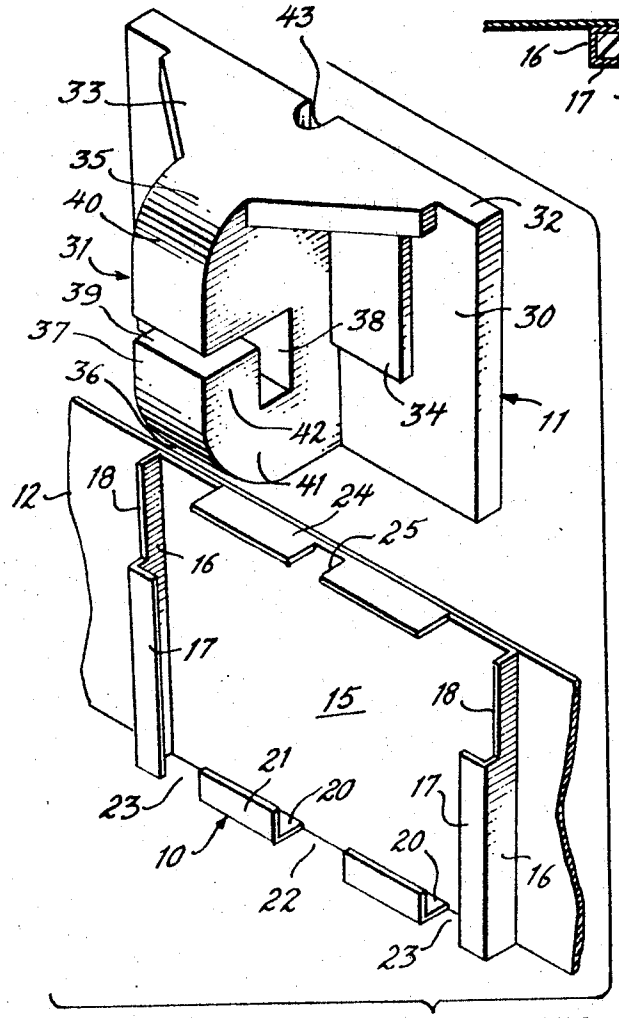

Fig. 1.

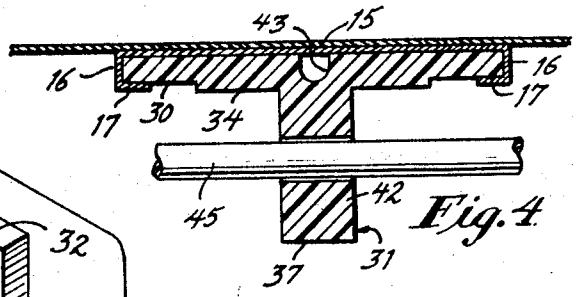

Fig. 4.

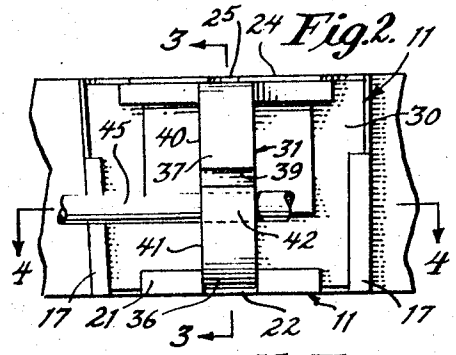

Fig. 2.

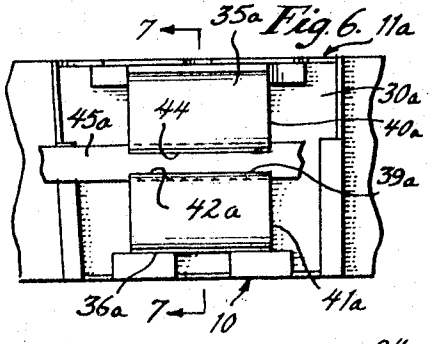

Fig. 6.

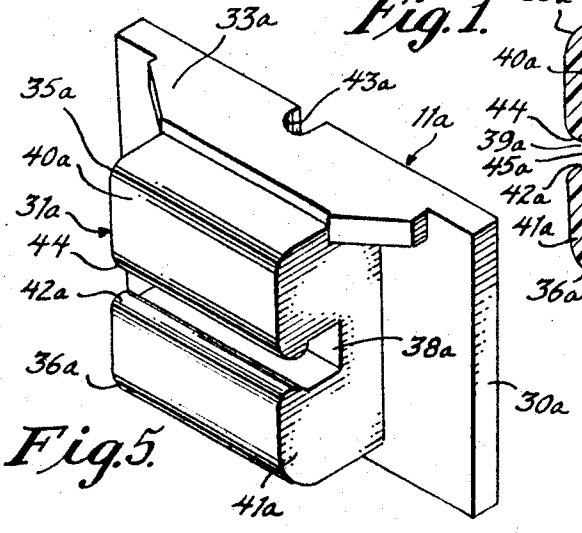

Fig. 5.

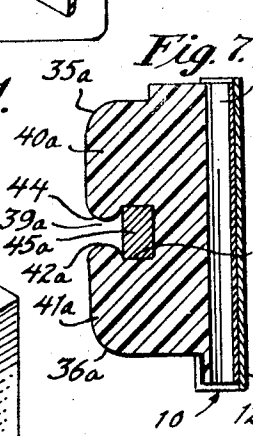

Fig. 7.

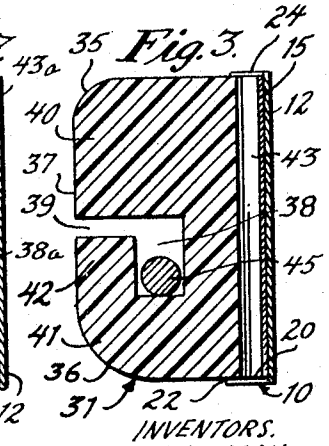

Fig. 3.

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ORTHODONTIC APPLIANCE

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Continuation-in-part of applications Ser. No. 520,383, Jan. 13, 1966, Ser. No. 551,022, May 18, 1966, and Ser. No. 569,967, Aug. 3, 1966. This application June 30, 1967, Ser. No. 650,527

Int. Cl. A61c 7/00

U.S. Cl. 32—14 8 Claims

ABSTRACT OF THE DISCLOSURE

This invention is concerned essentially with the provision of a unique bracket for attachment to the labial side of a tooth, wherein a receiver projects outwardly from the bracket and is provided with a laterally extending thru opening for receiving a wire, and a passageway extending outwardly from the opening for passing a wire sideways into and out of the opening. Resilient detent means projecting into the passageway for releasably retaining a received wire in the opening.

Cross-references to related applications

This application is a continuation-in-part of our copending patent applications Ser. No. 520,383, filed Jan. 13, 1966; Ser. No. 551,022, filed May 18, 1966 and now Patent No. 3,421,221; and Ser. No. 569,967 filed Aug. 3, 1966.

Summary

It is an important object of the present invention to provide an improved orthodontic appliance in the nature of a bracket for attachment to a patient's teeth, wherein arch wires, either edgewise or light wire are adapted to be quickly and easily snapped into position within the bracket, and with equal facility snapped out of the bracket, to effect substantial savings in time and effort for the orthodontist, and minimize discomfort to the patient.

It is a further object of the present invention to provide an improved orthodontic bracket of the type described, which is adapted for use with a unique receptacle, the bracket being interchangeable with respect to the receptacle, without removing the latter from the tooth, to greatly facilitate variations in treatment techniques, and permit of combination techniques heretofore impossible.

It is still another object of the present invention to provide an orthodontic appliance having the advantageous characteristics mentioned in the preceding paragraphs, which effectively eliminates or minimizes the use of tie wires or ligatures, virtually eliminates breakage of appliances, and greatly improves the esthetic appearance of orthodontic appliances in use.

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.

Brief description of the drawing

FIGURE 1 is a front perspective view, illustrating a receptacle and bracket of the present invention in exploded or spaced-apart relation.

FIGURE 2 is a front elevational view of the bracket and receptacle of FIGURE 1 in their operative association, having a light wire associated therewith.

FIGURE 3 is a sectional elevational view taken generally along the line 3—3 of FIGURE 2.

FIGURE 4 is a horizontal sectional view taken generally along the line 4—4 of FIGURE 2.

FIGURE 5 is a front perspective view illustrating another embodiment of bracket constructed in accordance with the teachings of the present invention.

FIGURE 6 is a front elevational view showing the bracket of FIGURE 5 in operative association with a receptacle and edgewise wire.

FIGURE 7 is a sectional elevational view taken generally along the line 7—7 of FIGURE 6.

Description of the preferred embodiments

Referring now more particularly to the drawings, and specifically to FIGURES 1–4 thereof, a receptacle is there generally designated **10**, for attachment to a patient's tooth, and a bracket is generally designated **11**, for removable and replaceable insertion into and withdrawal from the receptacle.

The receptacle **10** is adapted for attachment to a patient's tooth (not shown) by any suitable means, such as a band **12**, adhesive, or the like. The receptacle may advantageously be formed of sheet metal, say including a substantially flat, generally rectangular back wall or base **15** having forwardly outstanding, generally vertically extending side walls **16** along its side edges. The side walls **16** may each be provided with an inturned retaining lip or flange **17**, except at the upper side-wall region, which may be cut away, as at **18**. Thus, the retaining flanges **17** are in forwardly spaced, overlying relation with respect to adjacent portions of base **15**, being generally coplanar with each other. Along the lower or gingival edge of base **15** there may be provided a forwardly outstanding lower wall **20**, having at its forward edge an upstanding lip or retaining flange **21** substantially coplanar with the retaining flanges **17**. The lower wall **20** and its flange **21** may be medially cut away, as at **22**, and may terminate short of the side walls **16** and flanges **17**, as at **23**. Along the upper or occlusal edge of the base **15** there may be provided a forwardly projecting upper wall or stop **24** spaced medially between the side walls **16** and having a medial cutout **25**, generally opposite to and in alignment with the lower cutout **22**, for a purpose appearing presently.

The bracket **11** may advantageously be integrally fabricated of suitably resiliently deflectable material, such as molded of plastic, or the like, and is configured to include a generally flat, substantially rectangular plate **30**, and a receiver **31** projecting forwardly from the plate **30**. The receiver **31** may assume the form of a forwardly projecting lug substantially vertically coextensive with the plate **30**, and of a lateral dimension less than the plate. Along the occlusal edge **32** of the plate **30**, the upper edge as seen in the drawings, there may be formed a generally triangular rigidifying structure **33** projecting forwardly from the upper plate region and laterally outwardly from the upper region of receiver **31**, to buttress the latter. Also, additional reinforcement portions **34** may be formed on the plate **30**, on opposite sides of and along the inner regions of the receiver.

The receiver or lug formation **31** has its occlusal and gingival ends smoothly rounded, as at **35** and **36**, merging smoothly into a generally flat forward surface **37**. Extending laterally, entirely through the receiver or lug formation **31** is an opening **38**, illustrated as of generally rectangular formation. A passageway **39** extends forwardly and rearwardly between the opening **38** and through the front receiver surface **37**. Further, the passageway **39** is coextensive with the opening **38** in the lat-

eral direction, so as to open through opposite sides of the lug structure **31**; and, the passageway **39** is of a vertical dimension less than that of the opening **38**, and has its upper, internal surface substantially flush with the upper internal surface of the opening **38**.

It will therefore be appreciated that the opening **38** and passageway **39** combine to subdivide the receiver or lug structure **31** into a pair of vertically spaced occlusal and gingival arms, respectively designated **40** and **41**. The arms **40** and **41** are spaced apart by the opening **38** and passageway **39**. Further, the reduced dimension of the passageway **39** serves to define on the gingival arms **41** a protuberance **42**, which may be considered as projecting into the space between the arms **40** and **41**. As the receiver **31**, and the entire bracket **11**, are advantageously formed of resiliently deflectable material, the arms **40** and **41** may be moved slightly apart, to enlarge the vertical dimension of passageway **39**, for a purpose appearing presently.

The plate **30** is advantageously formed with a generally vertically extending passageway, as by a groove **43** on its inner surface opening at its opposite ends through the gingival and occlusal edges of the plate.

In use, the plate **30** of bracket **11** may be assembled with the receptacle **10** by engagement of the gingival edge corners beneath respective flanges **17** and movement of the plate **30** toward the gingival flanges **21** for engagement therebeneath. In this operation, the plate **30** rides over the stop **24**, snapping therebeyond into facing engagement with the receptacle base **15** and retained therein by the stop **24**, as best seen in FIGURES 2–4. While the bracket **11** is effectively retained in this condition within the receptacle **10**, its removal may be accomplished by reversal of the above-described operation, preferably employing a pliers or suitable tool for manipulation of the bracket.

With the bracket **11** assembled in the receptacle **10**, on the tooth of a patient, a wire, such as a light wire **45** may be snap-engaged by sidewise movement through the passageway **39** into the opening **38**. That is, the arms **40** and **41** are resiliently deflected sufficiently to pass the wire **45** beyond the protuberance **42** and into the opening **38**, where the wire is loosely received, permitting resilient return of the arms to their normal, undistended condition. In this condition, the protuberance **42** effectively closes the passageway **39** to a dimension sufficiently small to retain the wire in the opening **38**.

Removal of the wire **45** may be effected by the reversal of the above-described procedure, employing a spreading tool for the arms **40** and **41**, if desired, or a grasping tool to hold and move the wire.

We have found surprisingly enough that the bracket of this invention permits in many instances the use of wire, such as a light wire **45**, without ligatures. This is due to the tight fit between the wire **45** and the protuberances **42**. The elimination of ligatures not only saves a considerable amount of the orthodontist's time but also removes unsightly wire from the patient's mouth.

With the bracket **11** in the receptacle **10**, it will be apparent that the bracket-plate passageway **43** aligns or registers with the receptacle cutouts **22** and **25**, to define a thru vertically extending opening. This opening may be employed for insertion therethrough of an uprighting tool, or for other purpose, as desired.

Referring now to the embodiment of FIGURES 5–7, in FIGURE 5 is shown a slightly modified bracket **11*a*** particularly adapted for use with the edgewise orthodontic technique. The bracket **11*a*** may be employed with the same receptacle **10** as described in connection with FIGURES 1–4. Further, the bracket **11*a*** for edgewise technique is inserted into and removed from the receptacle **10** in the same manner as described hereinbefore.

The bracket **11*a*** may include a generally rectangular plate **30*a*** provided on its forward or labial side with a forwardly projecting receiver or lug structure **31*a***. If desired, a reinforcement or gusset structure **33*a*** may extend from the plate **30*a*** to the receiver **31*a***, similar to the reinforcement **33**. Also, the plate **30*a*** may be provided on its inner side, adjacent to an associated tooth, with a vertically extending open-ended passageway or groove **43*a***, corresponding to the passageway **43**.

The receiver or lug structure **31*a*** may be substantially vertically coextensive with the plate **30*a***, and may be of a selected width, usually less than the lateral extent of the plate. As in the first-described embodiment, the plate **30*a***, receiver **31*a*** and reinforcement **33*a*** may all be advantageously integrally fabricated of suitably resiliently deflectable material, such as by molding of plastic, or otherwise.

The lug structure or receiver **31*a*** is formed with a laterally extending opening **38*a***, which opens at its opposite ends through opposite sides of the receiver, and is advantageously of a generally rectangular cross-sectional configuration, conforming essentially to that of an edgewise wire **45*a***. Further, the receiver or lug structure **31*a*** is formed with a passageway **39*a*** extending forwardly and rearwardly between the opening **38*a*** and through the forward surface of the receiver. The passageway **39*a*** is of a vertical dimension less than that of the opening **38*a***, and is laterally coextensive with the opening **38*a***, so as to open through opposite sides of the receiver.

It will therefore be appreciated that the opening **38*a*** and passageway **39*a*** effectively subdivide the receiver **31*a*** into a pair of vertically spaced, forwardly or outwardly projecting occlusal and gingival arms **40*a*** and **41*a***. The upper and lower corners of respective upper and lower arms **40*a*** and **41*a*** are advantageously rounded, as at **35*a*** and **36*a*** for comfort and safety to the patient.

Further, the occlusal and gingival arms **40*a*** and **41*a*** may each be considered as provided with a protuberance, as at **44** and **42*a***, respectively projecting into the interarm space defined by the passageway **39*a***. The protuberances **44** and **42*a*** are advantageously rounded in the forward and rearward direction of passageway **39*a***, to facilitate snap-engagement therethrough and riding thereover of an edgewise wire **45*a***. That is, the edgewise wire **45*a*** of rectangular cross section may be moved sideways through the passageway **39*a***, upon resilient deflection of arms **40*a*** and **41*a*** to open the passageway **39*a*** for snap-engagement therethrough and into conforming reception in the opening **38*a***, as seen in FIGURES 6 and 7. In this condition, the edgewise wire **45*a*** is held against rotation, as required for practice of the edgewise technique, while being readily removable and replaceable by reversal and repetition of the abovedescribed procedure. In normal conditions of use, the protuberances **42*a*** and **44** extend into the space between arms **40*a*** and **41*a*** to provide detents releasably retaining the wire **45*a*** in its proper operative condition, and permits in many instances, if desired, the elimination of ligating wires.

It is also within the purview of this invention to affix the bracket **10** directly to the tooth thereby permitting elimination of receptacle **10** and band **12**. In this embodiment of the invention, the bracket may be affixed directly to the tooth by means of an adhesive such as an alpha-cyanoacrylate, polyurethane, or epoxy adhesives, etc. After the bracket has been positioned firmly on the tooth by the adhesives, the wire **45** may be snapped into the bracket as previously described and held in place in many instances without ligatures.

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

What is claimed is:

1. In an orthodontic appliance, the combination comprising a bracket plate of stiff resilient material adapted for attachment to a tooth in facing relation with the labial side thereof, a receiver lug of stiff resilient material integral with and projecting outwardly from said bracket

plate away from the associated tooth, said receiver lug being provided with a laterally extending through opening for receiving a wire and having a passageway extending outwardly from and coextensive with said opening for passing a wire into and out of said opening, said opening and passageway subdividing said lug into vertically spaced outwardly projecting gingival and occlusal arms, and a rigidifying structure connecting said bracket plate to at least one of said arms, said passageway having a vertical dimension smaller than the thickness of the wire, whereby the wire may be held in said opening without ligating by passing the wire through the passageway into the opening.

2. An orthodontic appliance according to claim 1, said rigidifying structure comprising gusset means extending integrally from said one arm laterally and inwardly to said bracket plate.

3. An orthodontic appliance according to claim 1, said opening being of generally rectangular cross section for conforming reception of an edgewise wire.

4. An orthodontic appliance according to claim 3, in combination with a protuberance on at least the other of said arms extending integral therefrom into the interarm space to define said smaller vertical dimension of said passageway.

5. An orthodontic appliance according to claim 3, said protuberance being rounded for snap riding thereover of an edgewise wire.

6. An orthodontic appliance comprising in combination a bracket adapted for attachment to a tooth on the labial side thereof, a receiver projecting outwardly from said bracket away from the associated tooth, said receiver being provided with a laterally extending through opening for receiving a wire, said receiver having a passageway extending outwardly from and coextensive with said opening for passing a wire sideways into and out of said opening, resilient detent means projecting into said passageway for releasably retaining a wire in said opening

without ligating, said bracket comprising a generally flat plate in facing relation with the labial side of the associated tooth, and said receiver comprising a lug of resilient deflectable material projecting outwardly from said plate, said opening and passageway subdividing said lug into spaced outwardly projecting gingival and occlusal arms, said detent means comprising a protuberance on at least one of said arms extending into the interarm space and resiliently yieldable for snap engagement thereby of a wire, and a receptacle adapted for attachment to a tooth to receive said plate, said receptacle comprising a generally flat base, retaining flanges on the gingival and opposite side edges of said base, and a stop on the occlusal edge of said base, whereby said plate is slidable over said stop and beneath said flanges for retention on said base.

7. An orthodontic appliance according to claim 6, said gingival flange and occlusal stop having opposed cutouts, and said plate having a passageway in alignment with said cutouts when on said base, for extension through said plate passageway and cutouts of a ligating wire, uprighting tool, or the like.

8. An orthodontic receptacle for attachment to a tooth to receive a bracket plate, said receptacle comprising a generally flat base, retaining flanges on the gingival and opposite side edges of said base, and a stop on the occlusal edge of said base, whereby a bracket plate is slidable over said stop and beneath said flanges for retention on said base.

References Cited

UNITED STATES PATENTS

1,991,047	2/1935	Boyd	32—14
2,236,042	3/1941	Terwilliger	32—14
2,908,974	10/1959	Stifter	32—14
3,052,027	9/1962	Wallshein	32—14
3,089,242	5/1963	Weissman	32—5

ROBERT PESHOCK, Primary Examiner