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Wildman

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[54] **ORTHODONTIC BRACKET WITH SPRING CLIP RETAINER MEANS**

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[52] **U.S. Cl.** ..... **32/14 A**

[51] **Int. Cl.** **A61c 7/00**

[58] **Field of Search** ..... 32/14 A

[56] **References Cited**

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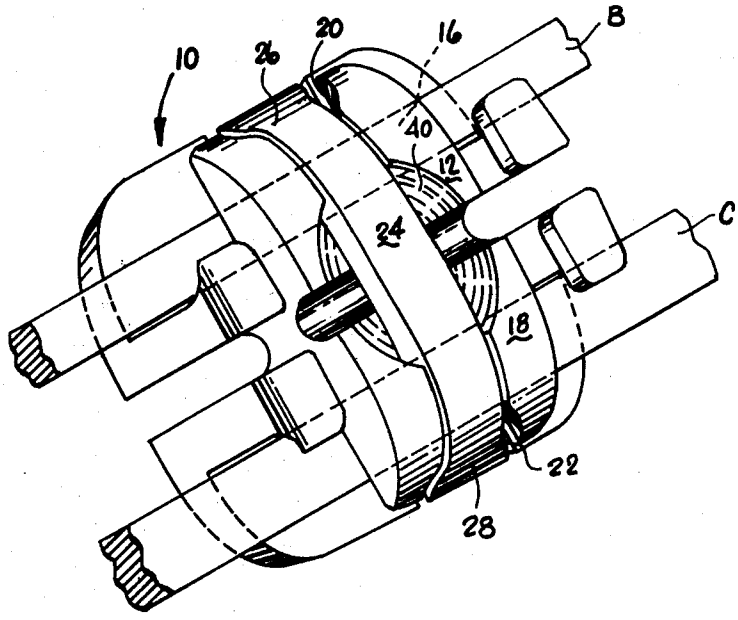
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[57] **ABSTRACT**

An improved orthodontic bracket with two or more parallel channels extending therethrough near the bracket periphery for receiving arch wires and characterized by a movable U-shaped spring clip which resides in a groove perpendicular and adjacent to the arch wire channels for retaining the arch wires in place when the spring is fully seated in the groove.

14 Claims, 5 Drawing Figures



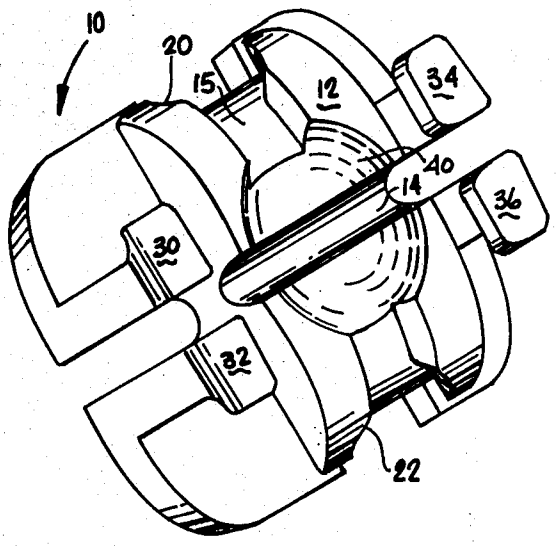


Fig. 1

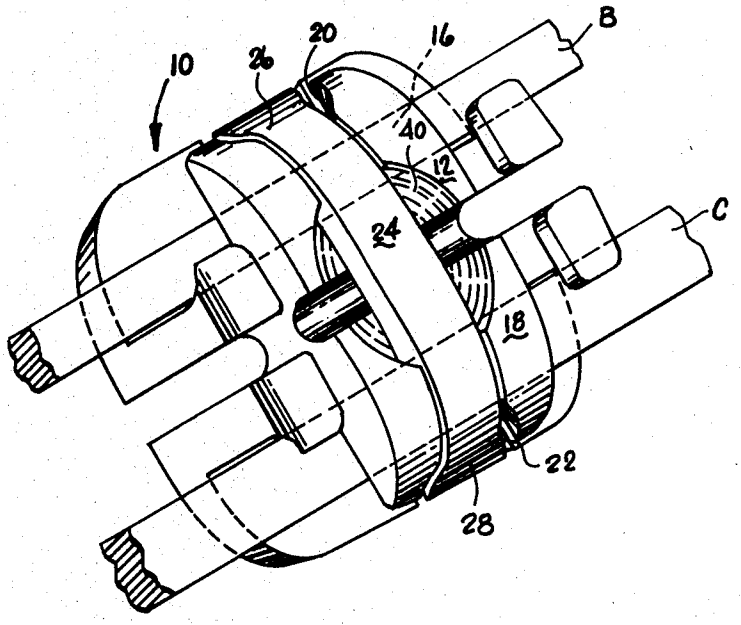


Fig. 2

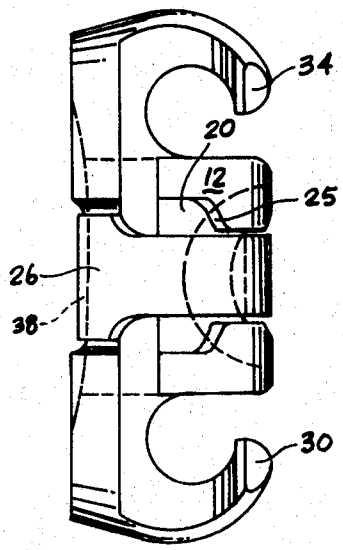


Fig. 3

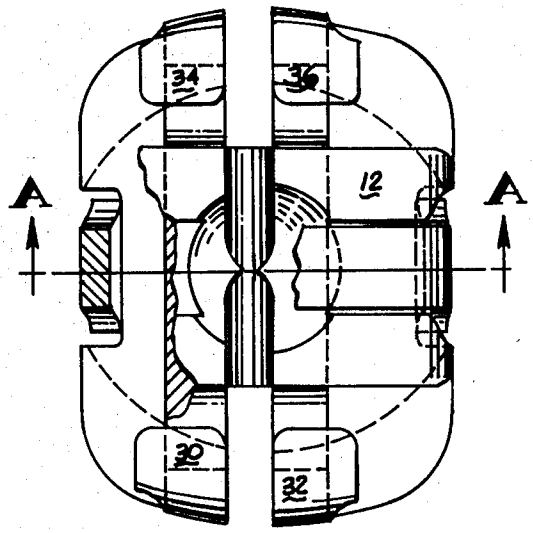
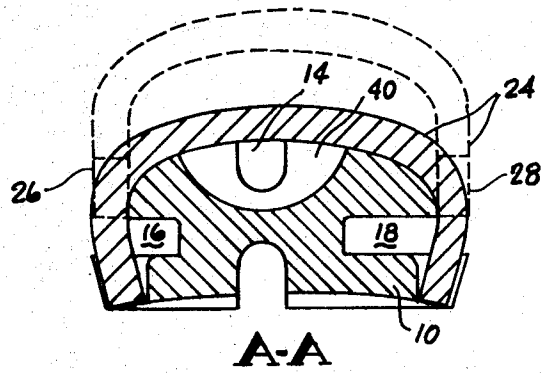


Fig. 4



A-A

Fig. 5

ORTHODONTIC BRACKET WITH SPRING CLIP RETAINER MEANS

FIELD OF THE INVENTION

The apparatus disclosed relates to orthodontic appliances, and more particularly to a bracket for securing arch wires in place especially adapted for the universal technique of orthodontic dentistry.

DESCRIPTION OF THE PRIOR ART

In the process of straightening teeth, arch wires are attached to teeth by means of brackets applied to individual teeth. The arch wires apply the necessary corrective force to each tooth. Therefore, the bracket must be adapted to retain the arch wires in a manner such that the arch wires may apply the requisite forces to the tooth to be straightened.

Previously, brackets have held wires by devices of varying complexity. Because the brackets are quite small in size, it is desirable to have a bracket in which arch wires may be easily fit into place and be retained. It is desirable to have a retaining member which may be easily grasped, applied, and which will securely remain in place, yet may be opened by an orthodontic practitioner without undue effort.

Many of the brackets of the prior art were complicated structures involving several members or complicated locking mechanisms. On the other hand, relatively simple brackets are unable to hold more than a single wire without cumbersome attachments.

In the practice of the universal technique of orthodontic dentistry, two arch wires are usually used, a first (ribbon) rectalinear wire of larger size located on the incisal, and a second smaller round wire, on the gingeval. The two arch wires are slightly spaced and parallel to each other.

It is the object of the invention to provide a simple bracket which will accomodate at least two arch wires as used in the universal technique, while utilizing a single retainer mechanism to secure all wires in place and which will open to release the arch wires by use of a simple tool.

SUMMARY OF THE INVENTION

The above object is achieved in a new orthodontic bracket by using a U-shaped spring clip fitting about the bracket transversely to adjacent arch wires residing in channels defined in the periphery of the bracket. The U-shaped spring clip has a pair of ears at the clip ends for engaging detent regions in the base of the bracket. The ears are smaller than the detents so that the clip may be moved within the limits set by the detent for exposing a pair of opposed arch wire channels after countering spring force thereby permitting arch wire egress.

The new bracket has a central raised portion which defines the pair of spaced, longitudinal channels, mentioned above, in a direction parallel to the length of the base. The channels are on opposed sides of the raised portion near the bottom thereof.

The raised portion of the bracket also defines a groove transverse to the channel. The groove has at least two spaced apart detents near the bottom of the base which are in spacial communication with the above mentioned, spaced, longitudinal channels so that the channels are open to respective detents.

After arch wires have been positioned in the pairs of channels, the spring clip is positioned in the groove to retain the arch wires. The spring clip ears, previously mentioned, correspond to the detents in the base for movable engagement with them. The ears do not occupy the complete detent region but only a portion thereof so that the spring clip may be moved to provide arch wires egress when in an open position yet may operably retain the arch wires in place when in a closed position. Auxillary longitudinal channels, parallel to the first pair of channels, are also defined through the bracket. The position of the auxillary channels is at the top and bottom of the central, longitudinal portion of the bracket. The auxillary channels accomodate other orthodontic force members, such as springs or ligature wires.

As a further feature, the apparatus includes a plurality of curved hooks whereon ligature wires may be tied in order to employ additional force, e.g. between the bracket and an adjacent bracket.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of the apparatus of the present invention.

FIG. **2** is another perspective view showing a pair of arch wires retained in place.

FIG. **3** is a side elevation of the apparatus shown in FIG. **1** without arch wires.

FIG. **4** is a top view of the apparatus shown in FIG. **3**.

FIG. **5** is a section of the apparatus shown in FIG. **4** taken along the lines A—A and showing the alternate positions of the bracket retainer member.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIGS. **1–5,** the apparatus disclosed herein has a base **10** which is generally flat on one side but which has a raised portion **12** on the opposite side. The base is usually made of a metal such as stainless steel which may be either soldered to annular bands which fit snugly about teeth or which may be adhesively fastened to a tooth.

The raised portion of the base defines a pair of spaced apart, longitudinal channels **16, 18** completely through the base in a direction parallel to the length of the base for receiving arch wires B and C. In the universal technique of orthodontic dentistry, the larger ribbon wire is located on the incisal, the smaller round wire on the gingeval. While the present invention is illustrated and described with reference to the universal technique, it is not restricted to such technique.

A groove **15** is defined in the raised portion **12** of the base such that the groove is transversely adjacent to the longitudinal channels **16, 18.** The groove **15** has a pair of spaced apart detents, **20, 22** contiguous to the channels **16, 18** respectively. In the preferred embodiment the detents **20, 22** are spaced at opposed lower base regions at opposite ends of groove **15.**

A U-shaped spring clip retainer means **24** is shaped to fit into the groove for the purpose of retaining arch wires placed in first and second channels, **16, 18** respectively when the spring clip is in the closed position as shown in FIGS. **2** and **5,** i.e., with the spring clip fully down. Spring clip **24** has a first ear **26** fitting into first detent **20** and a second ear **28** fitting into second detent **22.** Ears **26, 28** are shaped for movable engagement

within the respective detents. This is accomplished with the detents having a dimension parallel to the groove which is greater than the colinear dimension of the ears. The detents are large enough so that when the respective ears are in their uppermost position, the arch wires B, C residing in the channels **16, 18** respectively, have egress. In this position, indicated by the dashed line in FIG. **5**, the bracket is said to be in the open position.

The detents extend inwardly into the base from an upward detent edge wall toward the bottom of the base. Thus, the ears **26, 28** are mutually closer together when residing at the bottom of the base than near the top. This provides a snap fit for the spring clip **24.** The spring clip retainer means **24** has a spring force tending to push the ears together thereby tending to hold the ears in the respective detents. The spring material is preferably a tough resiliant metal which will maintain a spring force and which is relatively easy to manufacture.

In FIG. **5** the motion of the spring clip **24** may be viewed with the ears **26, 28** still within the respective detents. The ears are abutting the detent upward edge wall in the position indicated by the dashed line in FIG. **5.** Note that when spring clip **24** is in its uppermost positions, the first and second channels, **16, 18** are open so that respective arch wires B, C may be inserted therein and then retained in place by downward snapping of the spring clip **24** so that the spring clip operably secures the arch wire by closing the portion of each channel in spacial communication with a respective detent.

Base **10** defines a multiplicity of curved hooks, **30, 32 34,** and **36.** As can be seen in FIG. **3,** the curved hooks project inwardly in a direction facing groove **15** and outwardly in a direction facing detents **20, 22.** The hooks **30, 32** and **34, 36** are paired and spaced on opposite sides of the groove **15.** The curvature and spacing of the hooks is designed to allow tieing of ligature wire between any selected hook and another such hook on an adjacent bracket so that local forces may be applied between teeth as well as the general force applied by the arch wires.

It will be noted from FIG. **3** that the underside of base **10** is concave. The concave back accommodates the curvature presented by a band placed on a tooth so that the bracket is in solid contact with the band when the bracket is adhered to the band, as by welding. The curvature also permits a small amount of adhesive to be placed on the bracket in the event the bracket is to be adhesively applied directly to a tooth.

In FIG. **5,** it will be seen that there are a pair of auxillary channels **14, 17** defined through respective upper and lower portions of the bracket. The auxillary channels provide openings for ancillary orthodontic apparatus, such as springs and ligature wire. The auxillary channels are generally parallel to the first and second channels, **16** and **18** respectively and slightly offset from the centerline of the apparatus toward channel **16,** as seen in FIG. **5.** The offset preserves the strength of the bracket since more bracket material surrounds the larger channel **18** than if the auxillary channels were on the centerline.

It should be noted that the larger channel **18** need not hold only one arch wire, the ribbon wire on the incisal. Rather, a pair of adjacent wires may be placed therein, or the channel may be left empty, if desired.

In summary, the bracket **10** has at least a pair of opposed channels for seating arch wires and ancillary orthodontic devices. The bracket defines a groove transverse to such channels wherein a spring clip retainer means will be positioned. The U-shaped spring clip retainer **24** is substantially coextensive with the groove and has ears on spaced apart regions for engagement with corresponding detents in the groove. The ears occupy but a fraction of the detent area such that the spring clip retainer may be pulled up slightly for exposing channels lying beneath such ears. The spring clip retainer may be easily raised to its open position by an orthodontic practitioner using a tool which will raise the spring clip retainer such that the ears of the retainer are moved out of engagement with the detents of groove **15.** A slight dimple **40** is defined in the apex of raised portion **12** so that a tool may be inserted beneath the retainer clip **24** for raising it. The dimple should have a diameter greater than the spring clip width so that a tool, e.g. an explorer, may be used as a lever to raise the spring clip **28** and permit arch wire egress.

In the preceding description, such terms as raised portion, lower and upper have been used. These terms are relative to the drawings only and are not intended to be understood in any absolute sense.

We claim:

1. An orthodontic bracket comprising,

a base defining a pair of spaced, longitudinal channels, each of said channels having an opening for receiving at least one arch wire, said base further defining a pair of detents within opposed sides of said base, with a portion of said detents proximate to said channels extending further into said base than the remaining portion,

a U-shaped spring clip fitting about the bracket transversely adjacent to the opening of each of said channels, said clip having a pair of ears at the clip ends of a dimension less than the co-linear dimension of said detents for engaging a portion of the detents, said spring clip having spring force tending to push said ears together so that said spring clip closes said channel openings and permits arch wire release when said spring clip ears are moved within said detents to respective positions above said channel openings.

2. The apparatus of claim **1** wherein said base defines a multiplicity of curved hooks spaced from said spring clip.

3. An orthodontic bracket comprising,

a base having a raised portion defining a pair of longitudinal channels therethrough, each of said channels have an opening for receiving at least one arch wire, said base further defining a groove transverse to said longitudinal channel at the openings of said channels, said groove having a pair of spaced apart detents, within opposed sides of said base, with a first portion of said detents proximate to said channels and a second portion of said detents spaced from said channels, and

retainer means shaped to fit in the groove, said retainer means having a pair of spaced apart ears shaped for movable engagement with said detents in said first portion of said detents proximate to said channels, closing said channels for retaining arch wires therein, and in said second portion of

said detents, spaced from said channels, opening said channels for arch wire release.

4. The apparatus of claim **3** wherein said retainer means is a spring clip.

5. The apparatus of claim **4** wherein said detents have a dimension parallel to the groove greater than the co-linear dimension of said ears thereby permitting said ears of said spring clip to move along said dimension within said detents.

6. The apparatus of claim **3** having a multiplicity of curved hooks defined on said base and spaced from said spring clips.

7. An orthodontic bracket comprising,

a base having a raised portion, said raised portion defining first and second opposed longitudinal channels therethrough, each channel having an opening for receiving an arch wire, said raised portion further defining a groove transverse to said longitudinal channels, at said openings, said groove having a pair of detents at opposed lower base regions, and

a U-shaped spring clip coextensive with said groove, said clip operably retaining said arch wires from egress through said opening, said clip having a pair of ears at the clip ends of a size fitting within said detents, said spring clip also having spring force tending to push said ears together thereby tending to hold said ears in said detents.

8. The apparatus of claim **7** wherein said detents extend inwardly in the base from an upward edge wall toward the bottom of the base.

9. The apparatus of claim **8** wherein said detents have a dimension parallel to the groove greater than the co-linear dimension of said ears to the extent that said ears of the spring clip can move along said dimension until the ears abut the detent upward edge wall and said openings are exposed for arch wire egress.

10. The apparatus of claim **7** wherein said base defines an auxillary longitudinal channel therethrough parallel to said first and second channels.

11. The apparatus of claim **9** wherein said openings are proximate and in spatial communication with said detents below the detent upward edge wall so that upward movement of said clip ears to said detent edge wall permits arch wire insertion and egress from said openings.

12. The apparatus of claim **7** having a multiplicity of curved hooks, defined on said base and spaced from said spring clip.

13. The apparatus of claim **12** wherein pairs of said curved hooks are spaced apart on opposite sides of said groove.

14. The apparatus of claim **7** wherein a dimple having a diameter greater than the spring clip width is defined in the apex of said raised portion for allowing insertion of a tool beneath said U-shaped spring clip.

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