

[54] **ORTHODONTIC BRACKET**

3,043,006 7/1962 Wallshein 32/14 A

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[21] Appl. No.: **250,574**

[57] **ABSTRACT**

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

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

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

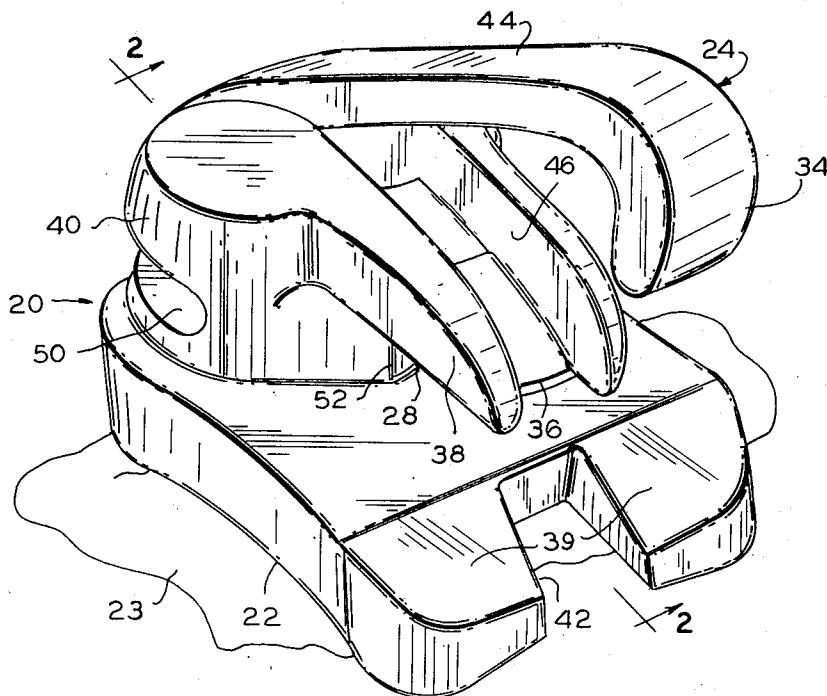
Improved orthodontic brackets include bodies having retainer hooks forming arch wire receiving eyes with either a groove in the head alone or with the groove and a C-ring spring which acts to lock the hook in its closed position and permits deliberate opening of the hook.

[56] **References Cited**

UNITED STATES PATENTS

2,318,001 5/1943 Linde 32/14 A

17 Claims, 11 Drawing Figures



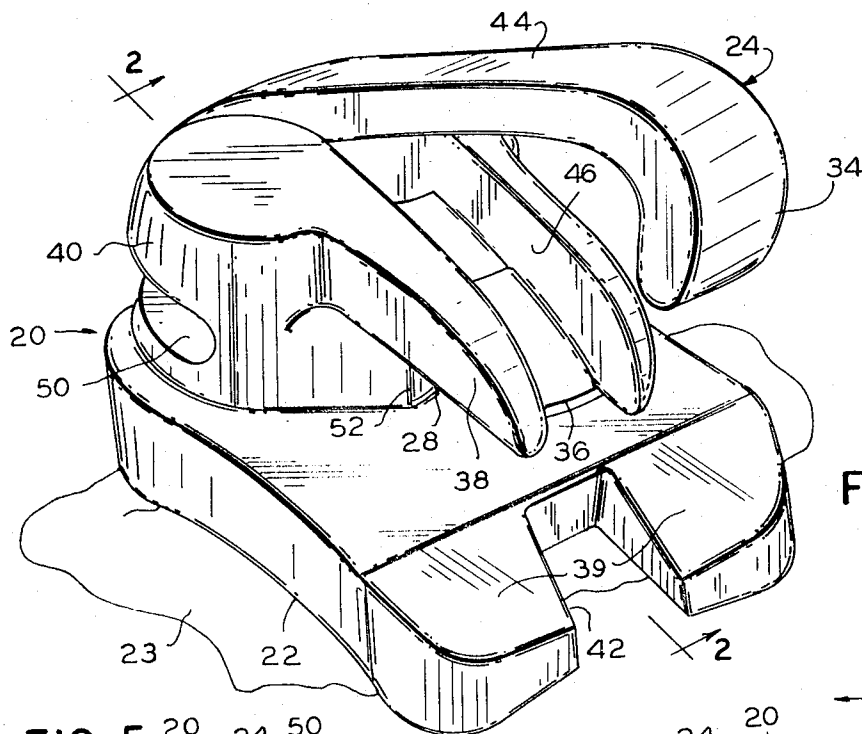


FIG. 1

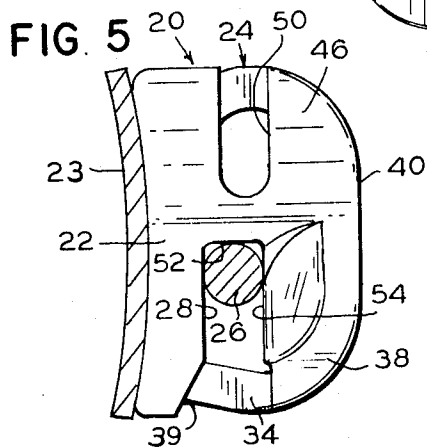


FIG. 5

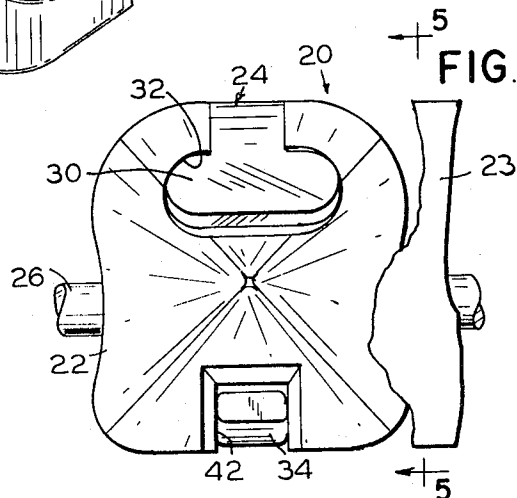


FIG. 3

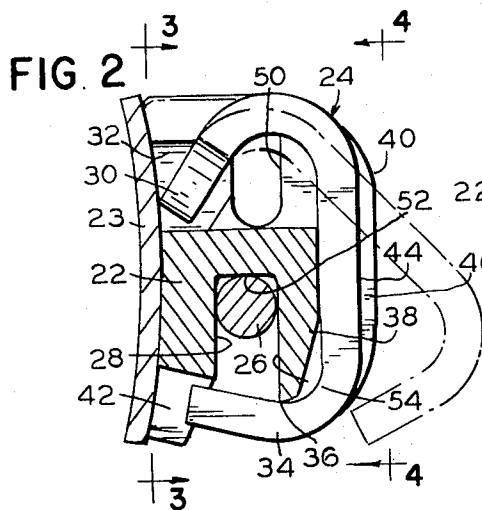


FIG. 2

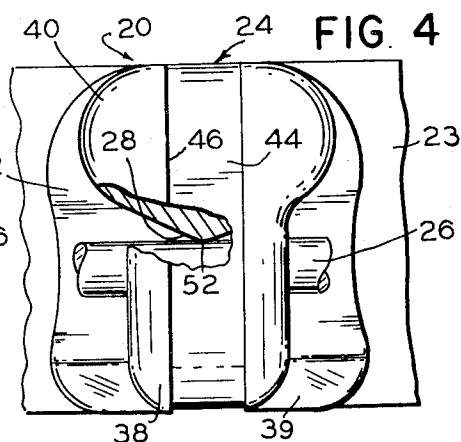


FIG. 4

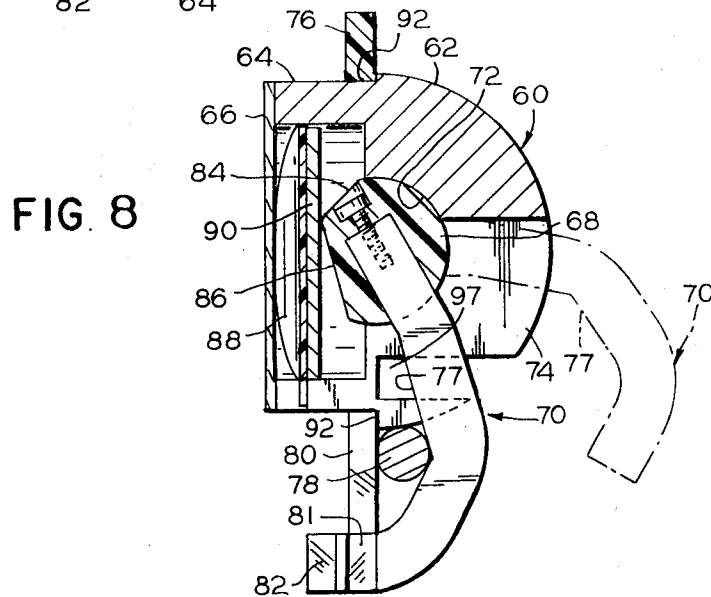
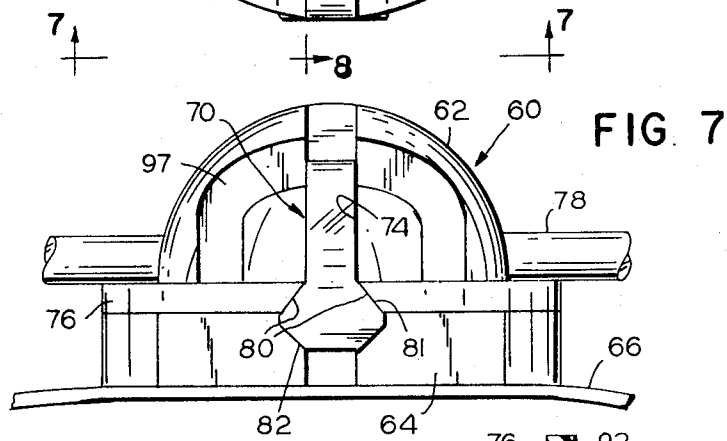
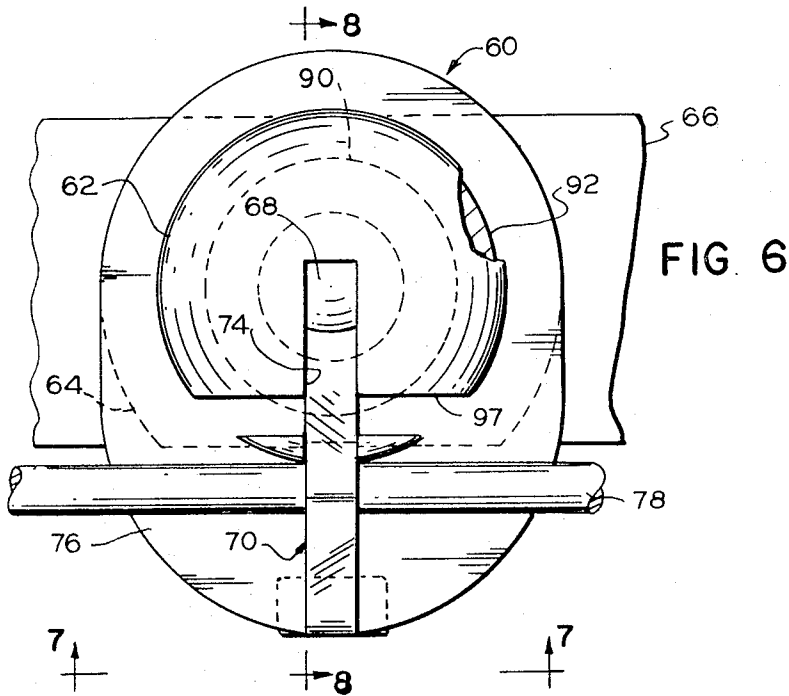


FIG. 9

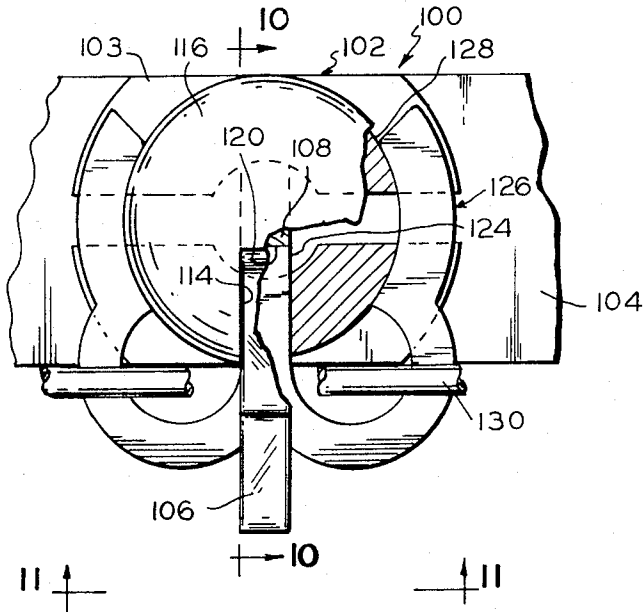


FIG. 11

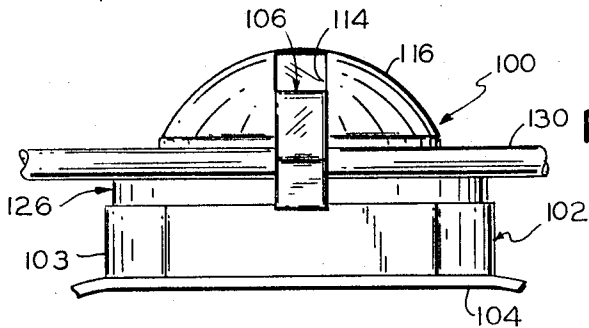
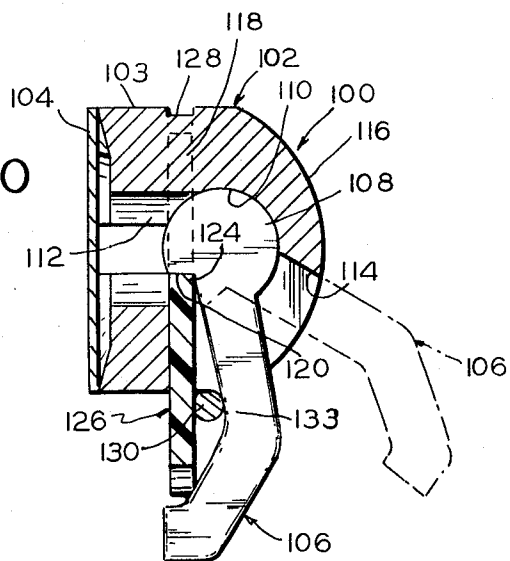


FIG. 10



ORTHODONTIC BRACKET

BACKGROUND OF THE INVENTION

The present invention relates to apparatus employed in orthodontics, and more particularly to an orthodontic bracket for use in attaching the arch wire of an orthodontic appliance to a tooth which is to be repositioned. This new and useful orthodontic bracket more specifically serves as a means of attachment for relatively light wires to a tooth in order to apply the desired correctional forces thereto.

DESCRIPTION OF THE PRIOR ART

In the practice of orthodontics, it is common to straighten teeth by means of an arch wire secured to certain teeth of a dental arch. The arch wire commonly is secured to the teeth by means of an attachment, there having been developed up to the present time a multiple number of differing designs for such attachments which are used by various proponents throughout the profession.

In the use of these prior art apparatuses, practitioners have developed a variety of techniques for installing and adjusting the same in treating a patient. In many instances, certain techniques require particularly designed apparatus, and techniques in many instances are dictated by particular apparatus design. In these techniques, particularly where light wire differential form technique is used, one finds practitioners utilizing brackets with the particular provisions on the brackets for the setting of a separate pin which holds the arch wire to the bracket.

During treatment of a patient, wherein orthodontic lock pins and bracket appliances are employed for such securing of the arch wire to the teeth, it is necessary to effect periodic adjustments which necessitate removal of the arch wire and replacing of the same. Thus, it becomes necessary to remove the lock pins from the brackets during removal of the arch wire. Heretofore, various amounts of difficulties occurred with this procedure. Pin deformation, breakage and treatment time required in pin removal and placement have been significant tasks for practitioners and their auxiliary help.

SUMMARY OF THE INVENTION

A principal and foremost object of the present invention is to provide for an orthodontic bracket which has an automatic arch wire locking device to replace the separate pin.

The present invention constitutes an improvement over prior art apparatuses in respect of facilitating installation and adjustment of arch wires. In this connection, ligatures and pins are eliminated and installation and adjustment are facilitated by the use of brackets with an automatic lever.

It is also an object of the present invention to present a bracket that has the facilities and that can be used in connection with a variety of different techniques employed in the profession. It is useful for the light wire technique now being utilized in the United States, and can also be used for the edgewise technique.

Another object of the present invention is to provide an orthodontic appliance utilizing a series of different, interchangeable auxiliaries which will apply as many straightening forces on a tooth as found necessary in the practice of orthodontics. None of these auxiliaries

will need the usual application of ligature wires to tie the auxiliary in or down; all auxiliaries will slide in and hold tight under various stresses because of a rectangular groove in the base of the bracket and the locking action of a lever arm, which eliminates all tying of auxiliaries.

A further object of the present invention is to provide a bracket that provides a smooth surface to the touching surfaces of patients' tissues. Heretofore with pins, pin placement areas and ligature areas, brackets have displayed various rectangular shapes and narrow corners. This invention utilizes oval shapes and provides only rounded surfaces allowing greater comfort via less irritation.

A still further object of the present invention is to provide a bracket to which can be attached a series of auxiliary springs, hooks, and other orthodontic devices in a horizontal groove in positions away from the tissue areas, but within the plane of the arch wire, thus eliminating auxiliary irritations caused by the touching of springs and other auxiliaries to the soft tissue surfaces.

Another object of the invention is to provide a bracket eliminating areas for food traps that sometimes occur with other contemporary brackets.

Another object of the invention is to present a bracket having a shape that will not tear or give minimum tearing in commonly used impression material.

Another object of the invention is to provide an orthodontic bracket including a pivotal latching arm.

In the drawings:

FIG. 1 is a perspective view of an improved orthodontic bracket forming one embodiment of the invention;

FIG. 2 is a vertical, sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a vertical, sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a partially sectional, front elevation view taken along line 4—4 of FIG. 2;

FIG. 5 is a vertical, sectional view taken along line 5—5 of FIG. 3;

FIG. 6 is an elevation view of an improved orthodontic bracket forming an alternate embodiment of the invention;

FIG. 7 is a bottom plan view taken along line 7—7 of FIG. 6;

FIG. 8 is a vertical, sectional view taken along line 8—8 of FIG. 6;

FIG. 9 is an elevation view of an improved orthodontic bracket forming an alternate embodiment of the invention;

FIG. 10 is a vertical, sectional view taken along line 10—10 of FIG. 9; and

FIG. 11 is a bottom plan view taken along line 11—11 of FIG. 9.

Referring now in detail to the drawings, there is shown in FIGS. 1—5 an improved orthodontic bracket forming one specific embodiment of the invention and including a body 20 having a base 22 secured to a band 23 attached to a tooth of a patient. The bracket also includes a self-latching, C-shaped hook or lever 24 of spring steel which is hinged to the body for pivotal movement between a closed position (shown in full lines in FIG. 2) retaining one or more arch wires 26 in a groove 28 and an open position (shown in broken lines in FIG. 20) permitting sidewise movement of the arch wire out of the groove.

The hook 24 includes a pintle portion 3 (FIG. 3) rotatable in a socket 32. The hook has a hook portion 34 (FIGS. 1 and 2) adapted to resiliently expand over a latching edge 36 of an overhanging arm 38 of a rounded button-like head 40 to latch the hook in a position in which the hook extends into a notch 42 in the base 22 to completely trap the arch wire 26 in the groove 28. The base 22 has sloping portions 39 to allow for sliding an instrument under the hook to open the hook. The portion of the hook extending across the groove 28 slopes upwardly and to the left as viewed in FIG. 2, so that contact thereof by the arch wire 26 tends to move the hook to the left in a further latching action. The hook also has a substantially straight, central portion 44, and except for the pintle portion 30 and the portion of the hook portion extending across the groove 28, fits substantially flush in a groove 46 in the head to eliminate food trapping cavities.

The body 20 also has an upper groove 50 for retaining springs or auxiliaries. The bracket provides a resting place for any auxiliary spring that might be locked in to the bracket which keeps such auxiliaries away from tissue areas. This resting place is on top of the base and to the side of the arm 38. The body has a V-shaped or ridge portion 52 at the bottom of the groove 50 adapted to make a line contact with the arch wire 26. The arm 38 also has a similar, V-shaped or ridge portion 54, which makes a line contact with the arch wire. There are four dimensions that contain the arch wire. Unique to these dimensions is that three of them provide single edges or single point contact for the arch wire. The base is cut away at an angle, the arm 38 that holds the lever is heart-shaped, and the hook extending over and down from this protrusion presents an angled surface.

The hook 24 automatically locks the arch wire in place, no ligatures or pins being required. The hook when in its latching position, as shown in full lines in FIG. 2, serves to trap one or more of the arch wires 26 in the groove 28, and a spring or other auxiliary (not shown) in the groove 50 is attached to the arch wire. The auxiliaries merely slide in so that no ligature wire for the auxiliaries is required. Also, the groove 50 enables auxiliary springs, hooks and other orthodontic devices to be positioned entirely away from the tissue areas of the mouth while being in the plane of the arch wire. To take the arch wire out of the groove 28, the orthodontist merely hooks a hook-like tool under the end of the hook portion 34 and pulls the hook portion counter-clockwise, as viewed in FIG. 2, to the open position shown in broken lines, the hook springing past the latching edge 36. The base or pintle portion of the hook and the socket 32 in the body receiving the pin are of such configuration as to slightly bind to aid in locking the hook in both the open and closed position. This binding of the pintle portion alone prohibits movement past the "open" position. To reclose the hook, it is merely pressed clockwise to spring over the latching edge 36, the spring action then serving to bias the hook strongly toward its closed or latching position. The bracket is fully rounded so that it does not irritate the mouth, and has no areas tending to trap food.

EMBODIMENT OF FIGS. 6-8

An improved orthodontic bracket 60 forming an alternate embodiment of the invention includes a body 62 having a base 64 brazed to a band 66, which is

adapted to be placed on a tooth and traps a pintle portion 68 of a latching hook 70 in a hinging socket 72 in the body. The hook extends through a slot 74 and is pivotal between a closed position (FIG. 8) forming with a flat C-spring plate 76, an eye holding an arch wire 78 and an open position shown in broken lines permitting sidewise removal of the arch wire. The hook has an angular portion 77 engaging the arch wire at two points to form a three-point contact of the arch wire with the plate 76. The spring plate 76 has bevelled or camming portions 80, and the hook has bevelled or camming portions 81 and 82, the portions 81 being adapted to spread the arms of the spring to open the bracket and the portions 82 being adapted to spread the arms of the spring to close the bracket.

The bracket 60 also includes an alternate spring latching structure comprising flats 84 and 86 on the pintle portion of the hook and a spring 88 biasing a keeper plate 90 into engagement with the flats. The plate 90 and spring 88 are trapped in the body by the band 66. This alternate spring latching structure is an overcenter latch to latch the hook in either its closed position or its open position, and is additional to the latching action of the C-spring plate 76. The plate 76 fits in annular groove 92 and is rigid except in the plane of the plate. The plate 76 acts as a bearing or leverage plate for the arch wire. A groove 97 may be provided in the head to retain wire springs or auxiliaries. The hook when closed forms an eye with the groove 97 to trap the wire springs or auxiliaries.

EMBODIMENT OF FIGS. 9-11

An improved orthodontic bracket 100 forming an alternate embodiment of the invention includes a body 102 having a base 103 brazed to a band 104 for fastening on a tooth. A latching hook 106 has a pintle portion 108 rotatable in hinging portion 110 of a groove 112 opening to the rear of the base. The hook extends through a slot 114 in a button-like head 116 and neck 118 of the body, and has a flat 120 engaged by a finger 124 of a C-spring 126 mounted in an annular groove 128 formed between the head and the base 103. The C-spring holds the hook in its closed position shown in FIG. 10 in full lines and permits only deliberate opening of the hook to its open position shown in broken lines. The C-spring is wide and forms a bearing or leverage plate for an arch wire 130, the hook having an angular, arch wire contacting portion 133 forming an eye to make a three-point grip of the arch wire with the C-spring. The hook may be opened by hooking under the free end of the hook and pulling it counter-clockwise, as viewed in FIG. 10, and may be closed merely by pushing the hook clockwise.

What is claimed is:

1. In an orthodontic bracket:
a body adapted to be mounted on a tooth and having a groove for receiving an arch wire,
a retainer member mounted pivotally on the body between a closed position closing the groove and an open position opening the groove,
and releasable latching means serving to lock the retainer member in its closed position,
the body having a hinging socket, the hook having a pintle portion trapped in the socket.
2. The orthodontic bracket of claim 1 wherein the hook is generally C-shaped and is of spring material,

the body having a ledge over which the hook snaps to lock the hook in its closed position.

3. The orthodontic bracket of claim 2 wherein the body has a second groove for auxiliaries and closed by the hook when the hook is in its closed position.

4. The orthodontic bracket of claim 1 wherein the groove in the bracket and the retaining member have portions for engaging an arch wire with a line contact.

5. The orthodontic bracket of claim 4 wherein the hook is generally C-shaped and is of spring material, the arm having a latching edge over which the hook snaps to latch the hook in its closed position.

6. In an orthodontic bracket:

a body adapted to be mounted on a tooth and having a groove for receiving an arch wire,

a retainer member mounted pivotally on the body between a closed position closing the groove and an open position opening the groove,

and releasable latching means serving to lock the retainer member in its closed position,

the body having a base and a head, the head having a projecting arm overhanging the base and defining the sides of the groove with the base,

the retaining member being a hook,

the head having a hook-receiving groove therein in which the hook is substantially fully received.

7. The orthodontic structure of claim 6 wherein head and hook form a substantially smooth, rounded surface.

8. In an orthodontic bracket:

a body having a base portion and an arch member receiving groove extending horizontally and open at the bottom side of the body,

and a retaining arm freely pivotal on the back body about an axis parallel to the longitudinal axis of the groove between a closed position extending over the head and covering the slot and an open position permitting sidewise insertion and removal of an arch member into and from the slot.

9. The orthodontic bracket of claim 8 including latching means for latching the arm in its closed position.

tion.

10. The orthodontic bracket of claim 9 wherein the latching means also is adapted to latch the arm in its open position.

11. The orthodontic bracket of claim 8 wherein the body has a slot crossing the wire receiving slot and receiving the arm when the arm is in the closed position thereof.

12. The orthodontic bracket of claim 8 wherein the body has an overhanging portion and the arm has a hook position extending around the overhanging portion.

13. The orthodontic bracket of claim 8 wherein the arm is generally C-shaped and has at one end thereof a hinge portion, the body having a base with a hinging recess therein receiving the hinge portion.

14. The orthodontic bracket of claim 13 wherein the recess opens on the bottom of the base and the base traps the hinge portion in the recess when the base is brazed to a band.

15. In an orthodontic bracket:

a body adapted to be mounted on a tooth and having channel means for receiving an arch wire,

a retainer member mounted to rotate between a closed position in which said channel means is closed off, whereby the arch wire may be retained in said channel means, and an open position in which said channel means is open, whereby the arch wire may be inserted in or removed from said channel means, and

a hinge pivotally mounting said retainer member to said body, for pivoting about an axis substantially parallel to said channel means.

16. The bracket of claim 15 including:

latching means for releasably locking said retainer member in closed position.

17. The bracket of claim 15 wherein said hinge comprises:

a socket formed in said body and a pintle portion on said retainer member pivotal in said socket.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,748,740 Dated July 31, 1973

Inventor(s) Alexander J. Wildman

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 12, "Tis" should be --This--

Column 3, line 59, "serveing" should be --serving--

Column 5, Claim 5, line 1, "4" should be --6--

Signed and sealed this 20th day of November 1973.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.,
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents