April 20, 1965 M. S. FOGEL ETAL 3,178,822

COMBINATION ORTHODONTIC BRACKET

Filed April 9, 1963

FIG. 1

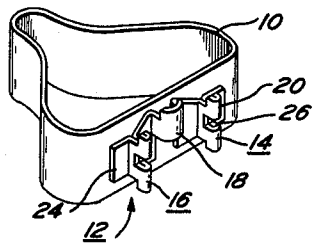


FIG. 2

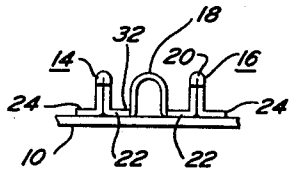


FIG. 3

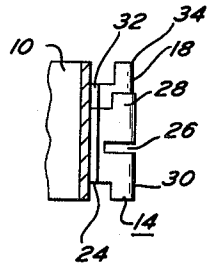


FIG. 4

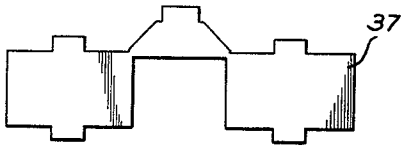


FIG. 5

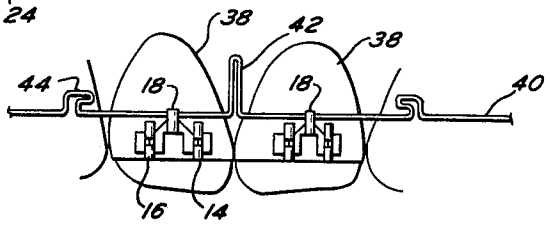


FIG. 6

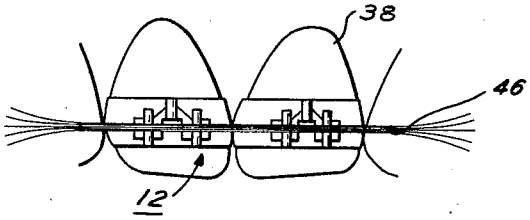
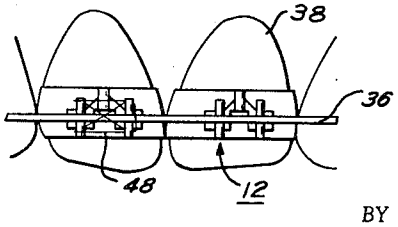


FIG. 7



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COMBINATION ORTHODONTIC BRACKET

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This invention relates to orthodontic appliances and particularly to a bracket unit that unites the light wire bracket with the double edgewise bracket on one band.

A principal object of this invention is to provide a new and improved orthodontic appliance that is practical and can be used as a universal unit for combining a number of different orthodontic therapy techniques. This universal combination unit should provide a broad range of action and adjustment and be able to accomplish easily and quickly all major tooth movements and arch relationships with as little time required as possible for the orthodontist to serve the patient in his office.

The need for such an appliance bracket arises from the varied therapeutic techniques that are often required in orthodontia. Great demands on an orthodontist make it desirable to provide means for treating and satisfactorily completing more patients in less time and still maintain high standards of achievement. In addition, the appliances should be continuous and long acting to require fewer adjustments on the patient and at long visit intervals to reduce the burden on the patient and the parents of child patients. Moreover, the orthodontic appliances should be simple and uniform in structure so that laboratory technicians and other auxiliary personnel can prefabricate the appliances in the laboratory. Such appliances would save many precious working hours for the orthodontist and avoid the confusion of heterogeneous appliance designs and therapy that tend to confuse associates and auxiliary personnel and would avoid the requirement of stocking many different orthodontic parts and supplies in various sizes, shapes, and lengths.

Thus, another object of this invention is to provide orthodontic appliances that can be uniformly preassembled and inserted precisely, rapidly, and painlessly to save valuable time for the orthodontist and permit him to spend more time on essential matters such as case analysis, diagnosis, and consultations.

From a therapeutic standpoint, a universal orthodontic appliance should be able to correct, with dispatch, the deep overbite affecting most malocclusions, and without excessive strain on anchorage. The appliance should provide facility for space closing, as well as space opening in crowded cases. The appliance should have features for simultaneously moving large numbers of teeth en masse without losing too much anchorage, either in the same or in the opposite arch. The appliance must be capable of effecting desired changes in complete arch or jaw relationships with minimal disturbance of anchor units or the excessive forward movement of the mandibular incisors. The appliance, when inserted into place, should also be a natural "power plant" from which energy can be derived in order to correct such common malpositions as rotations, intrusions, extrusions, cross-bites, midline disharmonies, and locked out and partially erupted teeth. The forces provided by such an appliance should be able to correct defective axial inclinations of any and all teeth needing such movement.

In the development of appliance brackets for the aforementioned treatments, a number are particularly pertinent to this invention. The single edgewise bracket has been used which receives a rectangular wire that is inserted edgewise into a slot in the double-winged bracket. This bracket was used for uprighting tipped teeth. To obtain greater purchase and wider attachment, a widely spaced

double edgewise bracket was developed, and this wide attachment was combined with the multiple, light steel round wire to provide a union of pliable light wire and wide bracket, which was successful in the treatment of most cases. The introduction of the light wire technique provided effective tooth positioning by means of tipping and light selective forces. With this technique, the detailed uprighting and torque movements of all teeth were performed during the final stage of treatment with little danger to anchorage and with decreased treatment time.

The introduction of the light wire technique indicated that the physiological response of the teeth to light, gentle forces was desirable and preferable to the heavier forces emanating from appliances then in use. However, the latter did not solve the uprighting and finishing problems, which often require a maze of compensatory auxiliaries, springs, and gadgets of all types to deal with the necessary uprighting, root paralleling, arch form, spacing, rotations, and the additional unpredictable reactions. The latter often involve numerous time-consuming problems to attain precise and controlled finishing.

In accordance with an embodiment of this invention, a single basic appliance unit is provided on an appliance band to accommodate a simple combination of a few wires to perform adequately the essential corrections. A light wire bracket member and a widely spaced pair of edgewise bracket members are combined into a single integral unit mounted on an appliance band. The edgewise bracket members are joined by a single light wire bracket member that bridges the edgewise bracket members. Thereby, a combined bracket is provided on an appliance band that affords a unit capable of use with both the light wire and edgewise bracket techniques at the different stages of treatment.

The foregoing and other objects of this invention, the features thereof as well as the invention itself, may be more fully understood from the following description when read together with the accompanying drawing, in which:

FIG. 1 is a perspective view of an appliance unit embodying this invention;

FIG. 2 is a top view of the appliance unit of FIG. 1;

FIG. 3 is a side elevational view of the unit of FIG. 1;

FIG. 4 is a face view of a metal blank from which the bracket of this invention is formed; and

FIGS. 5, 6, and 7 are face views of the appliance units of this invention applied to a series of teeth and respectively illustrating the application of the light wire, the multiple light arch wire, and the edgewise wire techniques in successive stages of treatment.

In the drawing, corresponding parts are referenced throughout by similar numerals.

In the embodiment illustrated in the drawing, an orthodontic appliance band **10** has a combination bracket **12** mounted on the face thereof. The bracket **12** incorporates two edgewise bracket members **14** and **16** and a light wire bracket member **18** all mounted in generally parallel relationship.

The edgewise brackets are generally the same in construction, and each is formed as a closed (or almost closed) U-shaped member **20**. The sides of member **20** extend transversely to the legs thereof to form rectangular, inner and outer spot-welding flanges **22** and **24** that lie generally in the same plane. A slot **26** of generally rectangular cross-section is cut in the curved face of the U-shaped member **20** and into the legs thereof at the central portion thereof. The ends **28** and **30** of the rounded portion of the U-shaped member extend and project longitudinally beyond the flanges **22** and **24** to form wire-engaging wings. The slots **26** of the two edgewise bracket members **14** and **16** are in substantial alignment to receive a common wire therethrough.

The light wire bracket member **18** is also U-shaped, and its curved outer face has a somewhat larger radius of curvature than that of each edgewise bracket **14, 16**. Member **18** is open at its underside to receive the usual fastening pins. Flanges **32** extend transversely from the outer sides of member **18**, which flanges **32** form a web continuation of the inner flanges **22** of the edgewise brackets **14** and **16**. Thus, the web flanges **32** and center bracket **18** form a bridge between the two edgewise bracket members **14** and **16**. The inner ends of the U-shaped bracket **18** and the web flanges **32** terminate just short of the slots **26** so as not to obstruct a connecting wire positioned therebetween (FIGS. 6 and 7). The outer end **34** of the web **32** terminates somewhat beyond the gingival (upper, as viewed in the drawing) ends of the wings **28**. The gingival end of the bracket **18** extends substantially to the edge of the attachment band **10** to provide a wire engaging wing **34** projecting beyond the web flanges **32**.

The slots **26** in the edgewise brackets may be cut at a right angle to the face of the U-shaped member **20**, as illustrated in FIG. 3, or they may be cut at a different angle to provide an angulated attachment for the edgewise wire **36** (FIG. 7) inserted therein.

Various techniques may be used for fabricating the bracket illustrated in the drawing. A suitable technique has been to bend the bracket from flat stock using orthodontic alloys of any suitable kind such as stainless steel. A suitable blank for the bracket is shown in FIG. 4. The bracket is bent in successive steps to form the flanges and the U-shaped bracket members, and the slots **26** are cut thereafter. This technique has been found appropriate for economical, sturdy, and reliable manufacture. However, other fabricating techniques, such as milling, may be employed if desired. It has been found to be possible to manufacture this bracket in two sizes: one is a wide bracket for the maxiliary incisors and the cuspids; and a narrow bracket is used for the mandibular incisors and the bicuspids. By way of illustration, the overall dimensions of the narrow bracket in an embodiment of the invention are .150 by .215 inch between the edges of wings **34** and **30** and the outer edges of flanges **24**; in the wide bracket the width is .265 inch.

Notwithstanding the extremely small size of the bracket, the construction thereof permits the use of the edgewise and light wire brackets in their normal manner. This is illustrated in FIGS. 5, 6, and 7, in which the appliance units are shown attached to teeth **38**. In FIG. 5 a light round wire **40** of about .016 inch diameter is shown engaged under the wings **34** of the brackets **18** applied to successive teeth. Loops **42** and **44** in the wire **40** are provided in the conventional manner for the application of tipping forces and for attachment, respectively. The open underside of each bracket **18** may be used for receiving a wire-retaining pin internally, or a wire ligature to tie the round wire **40** thereto in accordance with standard light wire techiques, and also for the insertion of springs in the customary fashion. With the light wire applied to brackets **18**, the wings of the edgewise brackets **14, 16** are free to be used for various attachments.

In FIG. 6 a multiple levelling wire **46** (having, for example, six strands) is shown attached to the slots **26** of the edgewise brackets in successive teeth. In FIG. 7 a rectangular edgewise wire **36** is shown inserted edgewise into the slots **26** of the edgewise brackets **16** and **14** on successive teeth **38**. The multiple levelling wire **46** and the edgewise wire **48** may be readily secured to the edgewise brackets **14** and **16** by suitable wire ligatures **48** wound in accordance with known techniques around the wings of those brackets and of brackets **18**. For example, soft wire of about .010 inch is conveniently wound about the wings of the edgewise brackets for securing the multiple levelling wire or edgewise wire in the slots thereof, and may also be wound about the light wire bracket

34 for that purpose. Sufficient space is provided between the brackets and under the wings for such tie wires.

In the illustrated bracket, the flanges **32** are tapered toward the wing **34** to avoid any binding of the light wire **40** and to afford additional space adjacent to the wings **28** of the edgewise brackets for wire ligatures. These flanges **32** have also been formed as rectangles to afford additional strength to the bracket especially during the bending fabrication thereof.

Thus, with the combination bracket illustrated in the drawing, successive therapeutic techniques may be applied in which a light wire may be secured to the light wire brackets **18** for gentle tipping; a multiple levelling wire **46** may be secured to the edgewise brackets for levelling and preliminary uprighting of the teeth; and an edgewise wire in the edgewise brackets is used for final detailed axial positioning of the teeth.

Accordingly, the combination bracket of this invention makes it possible to perform all of the therapeutic techniques required for normal orthodontic treatment so that but a single bracket need be applied to the teeth. This bracket is made as an integral unit which insures full alignment of the three brackets thereof and proper spacing. There is no interference between the various brackets; for example, the wings **28** of the edgewise brackets are completely free of the web flanges from the light wire bracket **18**, and the spacing between the bracket insures proper tying to each of the brackets as required. All of the functional requirements of both types of brackets are provided in the extremely small space of the appliance band and without interference between the brackets. The separation of the edgewise brackets **14** and **16** at their inner spot-welding flanges **24** and the bridging thereof by the web flanges **32** and the bracket **18** provide substantial resilience for the edgewise bracket members and make it easier to conform those brackets and the appliance band in that region to the contour of the tooth. The attachment of the combination bracket to the band is by means of four welding spots at the four welding flanges **24** and **26**, and with that simple attachment the proper alignment of the entire bracket is insured.

Accordingly, a universal combination orthodontic unit is provided by this invention which affords a broad range of action and adjustment to accomplish all of the major tooth movements. These orthodontic appliance brackets can be uniformly preassembled with substantial simplication in orthodontic appliance requirements. The universal orthodontic unit is readily mounted in the small space available on the face of the appliance band and dimensioned to extend between the opposite edges thereof.

What is claimed is:

1. An orthodontic appliance unit comprising an integral bracket unit including two generally parallel edgewise bracket members having aligned slots in the faces thereof, and a light wire bracket member connected between said edgewise bracket members and generally parallel thereto and having a portion at one end projecting out beyond the outer ends of said edgewise bracket members, having an internal channel transverse to the line of said slots, and terminating at the other end short of the line of said slots so as not to interfere with a wire placed in said slots.

2. An orthodontic appliance unit as recited in claim 1 wherein each of said bracket members has flanges projecting from opposite sides thereof, the flanges of said light wire bracket member being connected in bridging relation to spaced ends of adjacent flanges of said edgewise bracket members.

3. An orthodontic appliance unit comprising an appliance band, and an integral bracket unit including a plurality of winged bracket members attached in generally parallel relation to the face of said band, each of two of said bracket members having wings at the ends thereof and an intermediate slot in the face thereof to form an edgewise bracket, a third of said bracket members being mounted between said edgewise bracket members and

having an internal channel and a wing at one end projecting out beyond the outer end of a wing of each of said bracket members to form a light wire bracket, the slots in said edgewise brackets being generally along a line that extends adjacent to the other end of said light wire bracket and forming a passage for a wire that is not obstructed by said light wire bracket.

4. An orthodontic appliance unit as recited in claim 3 wherein a wing of each of said edgewise brackets terminates substantially at one edge of said band, and the wing of said light wire bracket terminates substantially at the other edge of said band.

5. An orthodontic appliance unit as recited in claim 3 wherein each of said bracket members has flanges projecting from opposite sides thereof, the flanges of said light wire bracket being connected in bridging relation to spaced ends of adjacent flanges of said edgewise bracket member.

6. An orthodontic appliance unit as recited in claim 5 wherein the flanges of said edgewise brackets are welded to said band.

7. An integral orthodontic appliance unit comprising two generally parallel edgewise bracket members, each of said edgewise bracket members including a folded member having longitudinally projecting wings at each end thereof, a slot in the face thereof between said wings and two welding flanges projecting transversely inwardly and outwardly from the sides of said folded member, the inner ones of said flanges being in spaced relation; and a light wire bracket member including a folded open U-shaped member having a longitudinally projecting wing at one end thereof, flanges projecting transversely from the sides of said U-shaped member and connected in bridging relation to the spaced inner flanges of said edgewise brackets, said flanges lying on a continuous surface, said edgewise

bracket slots being aligned to receive a wire without interference from said light wire bracket member.

8. An orthodontic appliance unit comprising two generally parallel edgewise bracket members and a light wire bracket member therebetween connected as an integral unit and bent from flat stock; each of said edgewise bracket members including a bent, closed U-shaped member having its opposite sides bent outwardly to form two spot welding flange plates, the rounded central portion of said U-shaped member having two end wings projecting longitudinally outwardly beyond the edges of said flange plates and spaced from the surface of said flange plates, and a slot of rectangular cross-section in the face of said central portion between the wings thereof, said edgewise bracket slots being generally aligned to receive a rectangular edgewise wire or a multiple levelling wire; said light wire bracket member including a bent U-shaped member having its sides bent to form two web flanges connected as a continuum of the inner flange plates of said edgewise bracket members, the rounded central portion of said U-shaped light wire bracket member being open and thereby adapted to receive a wire therein, said rounded portion of the light wire bracket member extending approximately from the line of said slots outwardly and beyond said web flanges and the ends of the wings of said edgewise bracket members to form a projecting wing for a light wire.

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RICHARD A. GAUDET, *Primary Examiner.*