July 13, 1965 S. M. BIEN 3,193,930

ORTHODONTIC APPLIANCE

Filed March 15, 1963

FIG. 1

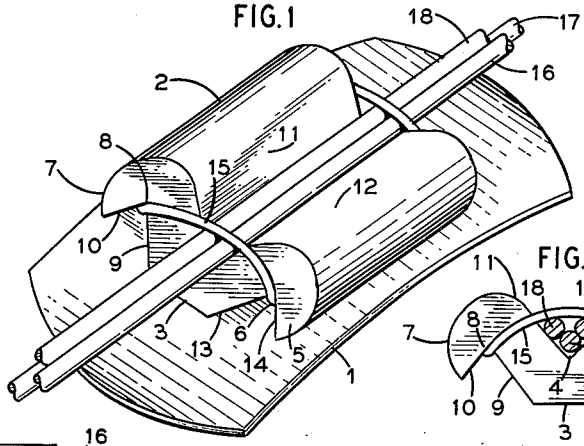


FIG. 3

FIG. 2

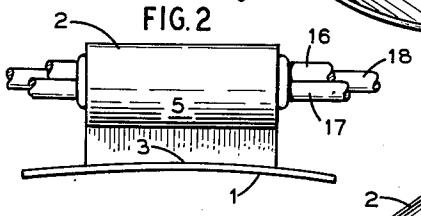


FIG. 4

FIG. 5

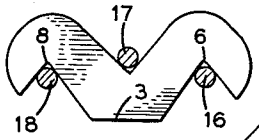


FIG. 6

FIG. 7

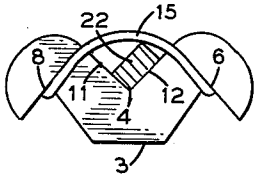


FIG. 8

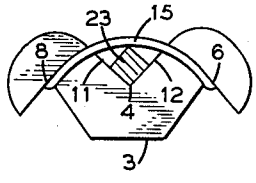


FIG. 9

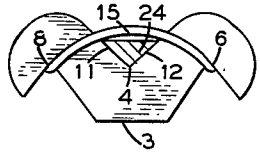


FIG. 10

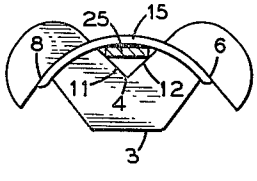


FIG. 11

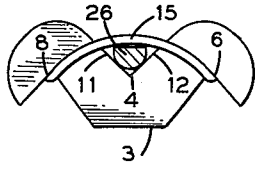
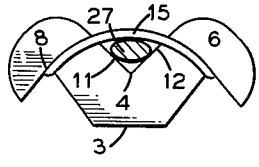


FIG. 12



INVENTOR.

Saul M. Bien

BY

ATTORNEY

United States Patent Office 3,193,930 Patented July 13, 1965

3,193,930

ORTHODONTIC APPLIANCE

Saul M. Bien, 76 Union Ave., Lynbrook, N.Y.

Filed Mar. 15, 1963, Ser. No. 266,157
4 Claims. (Cl. 32—14)

This invention relates to an orthodontic appliance known as a bracket. Its general purpose, although not entirely, is to guide and maintain arch wire, wire or elastic materials in proper relation to the tooth or teeth to which they are applied so that controlled force may be used.

One of the objects of this invention is to provide an improved form of orthodontic bracket constructed with a V-shaped central receiving channel for proper guidance and maintenance into position of arch wire or wires and with a curved flange extending on each side in order to provide an additional means for guiding and positioning arch wire or wires and/or tie wires, elastic threads or bands. This particular construction, which will be described in detail in the specifications, creates an improvement in that an inclined plane is provided for accurate guidance of the arch wire or wires. Basic to the invention is the gradual manner in which the tension is exerted by the arch wire or wires against the walls of the V-shaped central receiving channel. This gradual application of tension to the bracket permits, in finality, a more gradual movement of the tooth or teeth thereby minimizing painful or harmful responses to orthodontic treatment.

An additional object of this invention is to provide an improved form of orthodontic bracket capable of maintaining in an accurate and secure manner arch wire or wires of whatever shape or size which may be required throughout the entire course of orthodontic treatment. This includes arch wire or wires of round, oval, square, flat, rectangular and triangular shaped arch wire or wires of any required dimension and even the use of tooth-colored plastic ribbons of suitable shape and elasticity. With the use of a V-shaped central receiving channel secure and accurate control of very small round wire or wires is obtained at the base of the channel. With larger round wire or wires accurate and secure control is provided against the walls of the V-shaped central channel. Square or rectangular shaped wire or wires of any size are fitted with the angle on two sides of the wire or wires fitted accurately against the V-shaped central receiving channel. Triangular wire or wires may be fitted into position with two sides placed into the V-shaped channel. Oval shaped wire or wires may be inserted with either the narrower dimension or the wider dimension fitted into the V-shaped channel. Flat wires may be inserted to fit flat against either side of the V-shaped channel. Another object of this invention is to provide for the insertion of separated parallel wires which may be inserted simultaneously in the V-shaped central receiving channel and under each of the wings protruding from the top of the walls of the central groove. All or any of these wires or wire are fastened securely in place with wires or elastic thread or elastic bands or any other suitable manner.

Another object of this invention is to provide an improved form of orthodontic appliance which is capable of providing means of attachment for the use of elastic bands or threads in either a vertical, a horizontal or an oblique direction or any combination of these directions simultaneously without the use of separate hooks or fastening devices.

Another object of this invention is to provide an inclined plane towards which the arch wire or wires will gradually and gently be guided during treatment before the malposed teeth are sufficiently straight to permit the wire or wires to be set into their final accurate position.

An improvement is provided in this construction in that the arch wire or wires are aligned in proper position to the bracket even when the arch wire or wires make contact with any corner of the inclined plane of the bracket, whatever the malposition of the tooth, providing accurate gradual continuous control and guidance of tooth movement prior to the final positioning of the arch wire or wires with respect to the bracket and in finality, the tooth.

The objects enumerated above and the advantages of this invention will appear from the following details. A description of the several views of the drawings is as follows:

FIG. 1. A front view of the bracket in accordance with the invention attached to a tooth band with three small round arch wires in position in central receiving channel.

FIG. 2. A top view of the bracket in a vertical position with three small arch wires in position in central channel.

FIG. 3. A right end view of the bracket with three small round arch wires in position in central receiving channel.

FIG. 4. A front view of the bracket attached to a tooth band with three small round arch wires in position in the central and lateral channels fastened with a small coil spring and an elastic sleeve.

FIG. 5. A right end view of the bracket with three small round arch wires shown in FIG. 4.

FIG. 6. A right end view of the bracket with a single round arch wire in position in the center channel.

FIG. 7. A right end view of the bracket with a rectangular arch wire in position in the central channel.

FIG. 8. A right end view of the bracket with a square arch wire in position in the central channel.

FIG. 9. A right end view of the bracket with a triangular arch wire in position in the central channel.

FIG. 10. A right end view of the bracket with a flat arch wire horizontally in position in the central channel.

FIG. 11. A right end view of the bracket with a half round arch wire in position in the central channel.

FIG. 12. A right end view of the bracket with an oval arch wire horizontally in position in the central channel.

It is to be understood that this invention is not limited in its application to the details of construction and arrangements of its members shown in the drawings as this invention is capable of other embodiments and of being constructed in other ways. It is further understood that the language used herein is for the purpose of description and not of limitation.

Referring to the drawings, 2 in FIG. 1 represents the bracket in its entirety attached to a metal tooth band 1 by means of solder or by any suitable means at the base 3 of the bracket 2.

The bracket is essentially constructed by a milling operation, by die stamping, or by any other suitable method of fabricating a metal suitable for insertion and retention in the human mouth. A suitable plastic may be used with appropriate means of attachment to the tooth band 1 or to the tooth directly. The bracket is composed of a base 3 and lateral wings 5 and 7 which are continuous with base 3 and extend obliquely therefrom. The bracket 2 contains a V-shaped central receiving channel 4 in the base 3 and lateral V-shaped receiving channel 6 between base 3 and lateral wing 5; and with lateral V-shaped receiving channel 8 between base 3 and lateral wing 7; with the V-shaped receiving channels 4, 6, 8 all on the same plane. In FIG. 3 the walls 9, 12 and 13 are at a forty-five degree angle to the base 3 of the bracket 2. Walls 10, 11, and 14 are at right angles to walls 9, 12, 13. Construction of the central receiving channel 4 comprises two walls 11 and 12 preferably at right angles meeting and connecting on base

3 to make a V-shape. It is understood that the walls of the receiving channels not necessarily be at right angles to each other. Since the improvement in this bracket is in the creation of the V-shaped channels with sloping walls, the angles of meeting of the walls can vary so that a variety of shapes and sizes of arch wire or wires can be guided gradually and be aligned precisely. This is to be contrasted to channels having vertical or horizontal walls which may require deformation of arch wire or wires in order to effect engagement in the bracket; sudden application of excessive forces to the bracket, thereby to the tooth; or lack of accurate fit and control of the arch wire or wires which may not be of the exact dimensions of the usual brackets U-shaped slots with parallel walls vertical or horizontal relative to the surface of the band which is attached to the tooth. In FIGS. 1, 2 and 3 the arch wires **16, 17, 18** are disposed between the walls **11, 12** of the center channel **4**, and are held by an elastic band **15**, wire, or other suitable material which is engaged under the lateral wings **5, 7** within the lateral channels **6, 8**.

FIG. 2 shows the relationship of the bracket **2** to the tooth band **1** which is attached to a tooth.

FIG. 4 shows each of the three arch wires **16, 17, 18** in different channels of the bracket. Arch wire **17** is in position in the central channel **4**, while arch wire **16** is in lateral channel **6** and arch wire **18** is in lateral channel **8**. The arch wires are held in position by means of a sleeve **20** or sleeves constructed of a suitable elastic or rigid plastic, metal or other materials or by means of a coil spring **21** or springs.

A further improvement in the bracket is in the creation of a gentle torquing force on the bracket and thence to the tooth where either of the arch wires **16** or **18** gradually and automatically, but precisely exerts a balanced pressure against lateral channels **6, 8** using as a fulcrum arch wire **17** within central channel **4**. To increase or decrease the tension effect, the coils of spring or springs **21** can be opened or closed creating greater or lesser pressures. Another method for increasing or decreasing the pressures is by increasing the numbers of arch wires in any or all of the channels or by increasing or decreasing the size of the arch wires in any or all of the channels. With the improvement of the V-shaped channels various sizes of wires can be used with the same great precision and accuracy thereby assisting further in regulating the pressures necessary to effect a particular tooth movement.

FIG. 5 shows an end view with single round arch wires **16, 18** in each of the lateral channels **6, 8** and a single round arch wire **17** in central channel **4** of bracket **2** in FIG. 4.

FIG. 6 shows an end view of bracket **2** with a single round arch wire **17** held accurately within the center channel **4** using a ligature or an elastic band **15**.

FIG. 7 shows an end view of bracket **2** with a single rectangular arch wire **22** held accurately and securely against walls **11, 12** of center channel **4** using a ligature or an elastic band **15**.

FIG. 8 shows an end view of bracket **2** with a single square arch wire **23** held accurately and securely against walls **11, 12** of center channel **4** using a ligature or an elastic band **15**.

FIG. 9 shows an end view of bracket **2** with a single triangular arch wire **24** held accurately and securely against walls **11, 12** of center channel **4** using a ligature or an elastic band **15**.

FIG. 10 shows an end view of bracket **2** with a single flat arch wire **25** held against walls **11, 12** of center channel **4** using a ligature or an elastic band **15**.

FIG. 11 shows an end view of bracket **2** with a single half-round arch wire **26** held against walls **11, 12** of center channel **4** using a ligature or an elastic band **15**.

FIG. 12 shows an end view of bracket **2** with a single oval arch wire **27** held against walls **11, 12** of center channel **4** using a ligature or an elastic band **15**.

It is to be understood that other modifications in the construction of the above described bracket, one embodiments of which is described and illustrated herein, may be made without departing from the scope of this invention as defined in the claims.

I claim:

1. An orthodontic bracket for retention of and positioning of at least one arch wire and at least one tie wire comprising a base portion for attachment to a tooth, said base portion including substantially flat, diverging, oblique and intersecting first and second inner walls terminating in first and second wing portions respectively, said wing portions angularly and divergingly extending away from said first and second inner walls respectively, whereby an arch wire is adapted to abut at least one of said inner walls, and substantially flat, diverging and oblique first and second outer walls which intersect with said first and second wing portions respectively to provide tie means for a tie wire.

2. The orthodontic bracket of claim **1** wherein said inner walls define a V-shaped central channel in said base portion, and each of said outer walls and the associated wing portion respectively define a lateral channel.

3. In an orthodontic system, the combination of a tooth band, a bracket having a base portion attached to said tooth band, and an arch wire connected to said bracket by tie means, the improvement comprising the bracket having substantially flat, diverging, oblique, and intersecting first and second inner walls terminating in first and second wing portions respectively, said wing portions angularly and divergingly extending away from said first and second inner walls respectively and substantially flat, diverging and oblique first and second outer walls which intersect with first and second wing portions respectively, said arch wire being at least in abutment with one of said inner walls.

4. The orthodontic system of claim **3** wherein said inner walls define a V-shaped central channel in said base portion, and each of said outer walls and the associated wing portion respectively define a lateral channel.

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RICHARD A. GAUDET, *Primary Examiner.*

ROBERT E. MORGAN, *Examiner.*