April 7, 1964 J. J. SCHACHTER 3,127,677

ORTHODONTIC APPLIANCE

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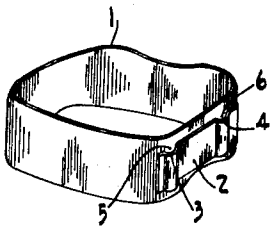


FIG. 1.

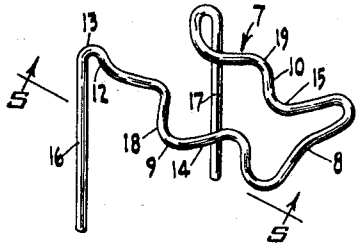


FIG. 2.

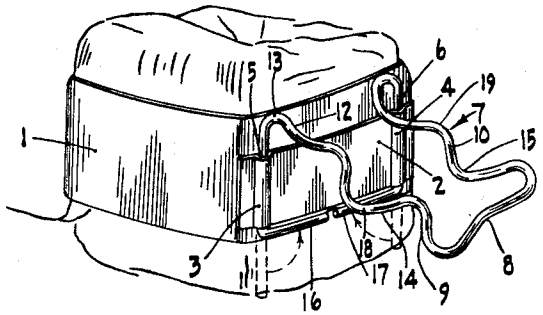


FIG. 3.

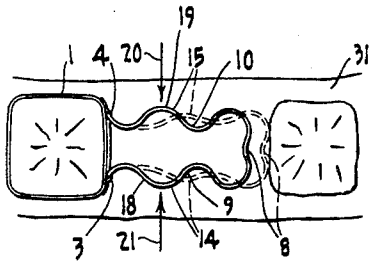


FIG. 4.

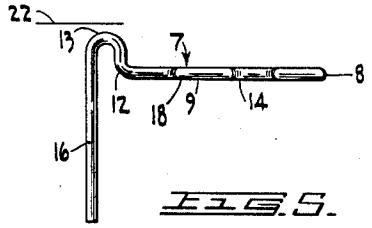


FIG. 5.

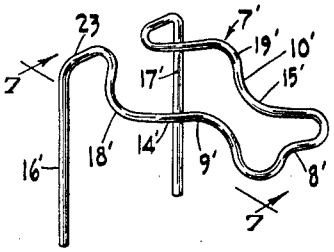


FIG. 6.

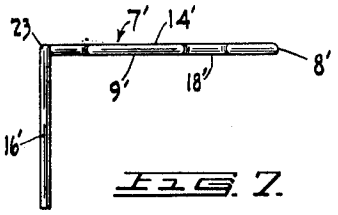


FIG. 7.

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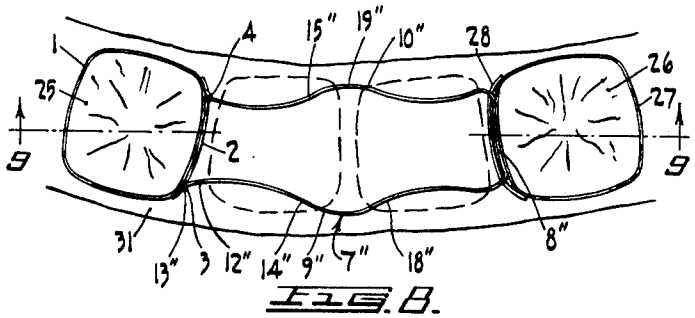


FIG. 8.

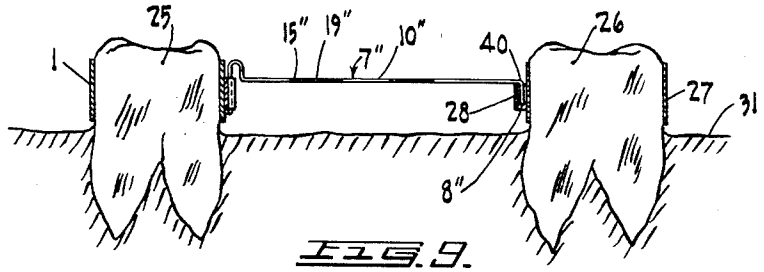


FIG. 9.

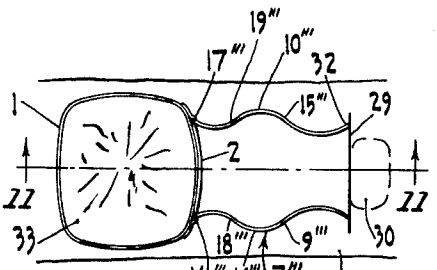


FIG. 10.

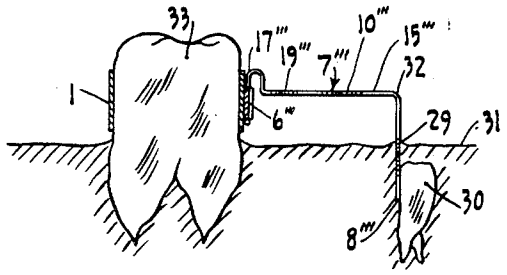


FIG. 11.

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ORTHODONTIC APPLIANCE

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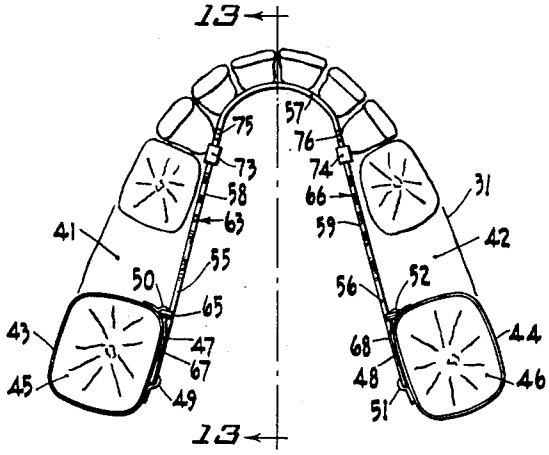


FIG. 12.

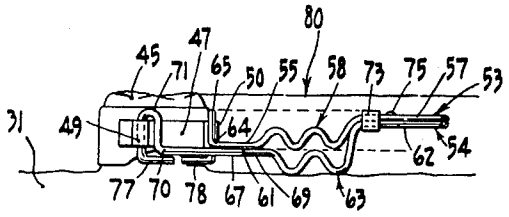


FIG. 13.

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ORTHODONTIC APPLIANCE

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Claims priority, application Canada Sept. 28, 1960
11 Claims. (Cl. 32—14)

This invention relates to orthodontic appliances and more particularly to space maintainers.

It is the present practice when fitting a patient with a space maintainer to fit a band on a tooth adjacent the edentulous area and take an impression with the band in place. The band is then removed and accurately placed in the impression and a model is poured. This model simulates the mouth with the band in place. The length of endentulous area is then precisely measured and a space maintaining member of the required length is prepared and welded or soldered to the band.

This procedure requires a higher degree of skill and laboratory facilities: as a general rule the practitioners will employ a laboratory to manufacture the space-mantaining member and secure it to the band.

The present invention enables the entire operation to be completed in one visit, obviates the necessity for taking impressions, and the skill and precision previously required to fabricate a space maintainer. There is also no need to solder or weld the space maintaining member to the band.

The main object of the present invention is to provide an adjustable space maintainer to restrain the migration of teeth into an edentulous area.

Another object of the present invention is to provide a space maintainer which may be fitted with facility.

Accordingly this invention relates to an orthodontic appliance which comprises: a band for a first tooth; and a space-maintaining member detachably securable to said band, said spacing member including a convolute portion thereby rendering the member longitudinally adjustable to engage a second tooth whereby said teeth are maintained in spaced relation.

This invention is illustrated by way of example by the following drawings in which:

FIGURE 1 is a perspective view top view of a band in accordance with the invention;

FIGURE 2 is a perspective top view of one embodiment of a spacing member in accordance with the invention;

FIGURE 3 is a perspective view of a tooth with a band of FIGURE 1 and a space-maintaining member of the type illustrated in FIGURE 2 secured thereto;

FIGURE 4 is a plan view of a space maintainer in accordance with the invention and illustrates the relationship between the space-maintaining member, the edentulous area and an adjacent tooth;

FIGURE 5 is a side view of the space-maintaining member illustrated in FIGURE 2 taken along line 5—5 of that figure;

FIGURE 6 is a perspective top view of an alternative embodiment of a space-maintaining member in accordance with the invention;

FIGURE 7 is a view taken along line 7—7 of FIGURE 6;

FIGURE 8 is a plan view of an edentulous area where more than one tooth is missing and also illustrates alternative means for securing the space-maintaining member to an adjacent tooth;

FIGURE 9 is a vertical section taken along line 9—9 of FIGURE 8;

FIGURE 10 is a plan view of a space-maintaining member also being employed as a guide for a succedaneous tooth;

FIGURE 11 is a vertical section along line 11—11 of FIGURE 10;

FIGURE 12 is a plan view of a jaw showing an alternative embodiment of the present invention in a mouth having edentulous areas on both sides of the median line; and

FIGURE 13 is a side view taken along line 13—13 of FIGURE 12.

Band 1 of the present invention is shown in FIGURE 1. It is of substantially conventional form and material. However, in the embodiments and uses illustrated by FIGURES 2 to 11 a strap 2 is secured to the outer surface of the band adjacent the area to be preserved. As will be seen from FIGURE 1 this strap, which is of metal similar to that of the band, is substantially rectangular having a width less than the depth of band 1, and has two spaced-apart transverse indentations 3 and 4 formed therein, so that when secured to the band 1 by welding or soldering in the manner shown, two upwardly extending tubes 5 and 6 are provided to secure a space-maintaining member indicated generally at 7 in FIGURE 2. It will of course be understood that each of the tubes may be separately fabricated and individually secured to the band.

The space-maintaining member 7 illustrated in FIGURES 2 to 5 comprises a continuous piece of wire which is reversely bent into a substantially U-shaped form having side-arms 9 and 10, and an inwardly curved distal portion 8.

Side arms 9 and 10 in turn each comprise two main portions: an intermediate portion, 14 and 15 respectively, and a terminal portion, 16 and 17 respectively. The intermediate portions 14 and 15 each have one horizontal convolution 18 and 19 therein and these convolutions are formed in a plane substantially parallel to the occlusal plane of the teeth. It should be noted that convolutions 18 and 19 extend in opposed directions. It will of course be understood that vertical convolutions may be employed. The terminal portions 16 and 17 are each doubly bent so that they extend in a plane at substantially right angles to their respective intermediate portions. This is best shown in FIGURE 2 where the terminal portion 16 is initially bent upward at 12 through approximately 90° and then downward through approximately 180° at 13. Terminal portions 16 and 17 have a length greater than tubes 5 and 6 and have a distance between them equal to the distance between tubes 5 and 6 so that when inserted portions 16 and 17 project beyond the bottom of tubes 5 and 6.

With the present invention when a patient requires a space to be maintained between two teeth the practitioner will fit a band 1 around a tooth adjacent the space in the usual manner. The distance across the space is then approximately measured and a space maintainer having an actual length x but an effective length of at least y, the length of the space, is selected. Commercially, the space-maintaining member will be provided in a variety of sizes. The band 1 is then removed from the tooth and terminal portions 16 and 17 of the selected space-maintaining member are inserted into tubes 5 and 6 and their furthest extremities are bent up in the manner shown in FIGURE 3. Space-maintaining member 7 is now firmly secured to band 1. Band 1 is then replaced around the tooth and firmly cemented in position. At this time the space-maintainer 7 will have the position indicated by the solid lines of FIGURE 4. When the cement is set pressure is then applied to the space-maintainer 7 at the points and directions indicated by arrows 20 and 21. Under this pressure the intermediate portions 14 and 15 of the space-maintaining member 7 will straighten and the intermediate portions 14 and 15 will assume the position indicated by the dotted lines. The distal por-

tion 8 will now abut the adjacent tooth and the device is securely fitted.

As will be seen from FIGURE 5 the upper extent of the terminal portions 16 are below the occlusal surface 22, level of the teeth. The double bend of the terminal portions 16 and 17 serve two main purposes; to maintain a large contact area between the space-maintaining member 7 and the band 1; and to ensure that the distal portion 8 engages the adjacent tooth at a point no higher than its contact point. The contact point for the purposes of this description is that point on the adjacent tooth which projects furthest over the space to be maintained. It will be obvious that if the space-maintaining member engages the adjacent tooth above this point then the space-maintaining member will not be firmly fitted.

In FIGURE 7 an alternative embodiment 7' of the space-maintaining member is illustrated in side view. The only structural difference between this member and the member 7 illustrated in FIGURE 5 is the absence of the double bend. There is only one bend 23 in the terminal portion 16' of space-maintaining member 7' and this at substantially right angles to the intermediate portion 14'. Side arm 15' which is not visible in this view is similarly bent, and the intermediate portions 18' and 19', the latter of which is not visible in this view are convoluted in a similar manner to intermediate portions 18 and 19 of the embodiment of FIGURE 2.

When a space maintainer of the present invention is to be employed to maintain a space left by two missing teeth as in FIGURE 8 then the space-maintaining member 7'' should be supported at the distal end 8''. FIGURES 8 and 9 show one such form of support. On tooth 25 a band 1 of the form illustrated in FIGURES 1, 3 and 4 is secured and a space-maintaining member 7'' is secured as previously described. However, around tooth 26 a second band 27 is secured. Band 27 also has a conventional structure but on the side adjacent the space a pocket 28 is secured. Into this pocket the distal portion 8'' of the space-maintaining member 7'' is turned down at 40 and the device is accordingly supported at both extremities.

The space-maintainer of the present invention may also be employed as a guide for erupting teeth. FIGURES 10 and 11 illustrate such a use. When the position of the erupting tooth 30 has been determined by X-rays the practitioner secures a band 1 to an adjacent tooth 33, and an incision 29 is made to permit entry of the distal portion 8''' of the spacing member. The spacing member 7''' is then bent at the required point 32 and inserted into incision 29 to abut the erupting tooth 30. Simultaneously, the terminal portions 16''' and 17''' are inserted in their respective tubes 5''' and 6''' where they are secured by bending upwards as previously described.

FIGURE 12 illustrates a plan view of the teeth in a mouth where teeth are missing from spaces 41 and 42 on opposite sides of the mouth. In this embodiment conventional bands 43 and 44 are secured to teeth 45 and 46 adjacent the areas to be preserved. Straps 47 and 48 of similar structure to strap 2 are respectively secured to bands 43 and 44. However, in this embodiment the two tubes 49 and 50 on band 47, and 51 and 52 on band 48, are secured in a different relationship to the edentulous areas and the tooth. Tubes 50 and 52 are located on the mesio-lingual angle of bands 43 and 44 respectively, and tubes 49 and 51 are disposed on the lingual sides of their respective bands.

The two tubes on each band are spaced apart a distance equal to the distance between the adjacent terminal portions of the space-maintainer so that these terminal portions may be inserted without distortion of the space-maintaining member. It should also be noted that the disposition of the tubes will permit the space-maintaining member to be worn with a minimum of inconvenience to the wearer.

The space-maintaining member in this embodiment comprises two individual wires 53 and 54 which for the greater part of their length are disposed one above the other. For the purpose of this description wires 53 and 54 will be termed the superior and inferior wires respectively.

The superior wire 53 comprises an anterior arch portion 57 of substantially arcuate form at each end of which convoluted expanding portions 58 and 59 are formed. Wire 53 is then terminated at each end by anchoring portions 55 and 56.

As shown in FIGURE 13 the anchoring portion 55 has a substantially horizontal part 61 at which it is secured to the inferior wire 54. It is then bent upward and buccally at 64 and bent downward through an angle of 180° at 65. Anchoring portion 56 has a similar structure.

The inferior wire 54 has a construction similar to the superior wire 53: it has a substantially arcuate anterior arch portion 62, at each end of which convoluted expanding portions 63 and 66 are provided. Wire 54 is then terminated at each end by anchoring portions 67 and 68. Anchoring portion 67 is shown in FIGURE 13. It has a substantially horizontal portion 69 which as previously mentioned is secured to portion 61 of wire 53. At the end of portion 69 wire 53 is turned upward at 70 and then bent downward at 71. At the other end of the wires the anchoring portions 56 and 68 are bent to the same form as their respective corresponding portions 55 and 67, and a similar joint corresponding to the joint of portions 61 and 69 is provided. Clamps 73 and 74 which embrace both the inferior and superior wires 54 and 53 are provided at each end of the anterior arch portions 57 and 62 adjacent the junctions with the convoluted expanding sections. The clamps may be secured to one or other of the wires or may be quite free so that they permit relative movement of the individual wires, and anterior to each of the clamps stops such as 75 and 76 are provided to limit the relative forward movement of the wires when being adjusted.

It should be noted from FIGURE 13 that the upper level of the clamps is below the occlusal level 80 of the teeth and on substantially the same level as the upper extent of the anchoring portion indicated at 65. It should also be noted that the convolutions of the expanding portions 58 and 63 are not parallel. The superior wire 53 has approximately two and one-half convolutions compared with two convolutions on the inferior wire 54. It will of course be understood that the corresponding expanding portions on the other side will be similarly convoluted. The lowest extent of the convolutions of the superior wire 53 is in the same plane as the junction along 61 and 69, and the upper extent of the convolutions of the inferior wire 54 is also in the same plane.

As in the previous embodiments the practitioner fits the bands 43 and 44 around teeth 45 and 46. The required space-maintaining member is then selected, the bands removed from the teeth, and the selected member inserted so that the turned down parts of the anchoring portions are inserted in their respective tubes.

The extreme terminal portions which project beyond the tubes are then bent up as shown in FIGURE 13 at 77 and 78. The extreme terminal portions are similarly bent up on the other side of the mouth and the space-maintaining member is firmly secured to bands 43 and 44. The assembled space-maintainer is then replaced in the mouth and adjusted. Since the two teeth to which the space-maintaining member is to be secured may be differently inclined each wire is individually adjusted by compressing their respective convolutions until the leading edges of the anterior arches abut the lingual surfaces of the incisors.

I claim:

1. An orthodontic appliance which comprises a band for a first tooth, securing means on said band, and a spacing maintaining member, said spacing maintaining member comprising a reversely bent wire having two side arms and a distal portion, said distal portion being arcuately

bent to engage a second tooth, said side arms each having at least one convolution therein and a terminally turned-down portion engaging said securing means on said band.

2. An orthodontic appliance as claimed in claim 1 wherein said securing means comprises a strap secured to the outer surface adjacent the space to be preserved, said strap having a pair of transversely extending indentations forming a pair of spaced-apart upwardly extending tubes projecting over said space.

3. An orthodontic appliance as claimed in claim 1 wherein said securing means comprises a strap secured to the outer surface adjacent the space to be preserved, said strap having a pair of transversely extending indentations forming a pair of spaced-apart upwardly extending tubes projecting over said space; said strap being secured to said band in such a manner that one of said tubes extends upwardly at the mesio-lingual angle of said band and said other tube extends upwardly on the lingual surface of said band.

4. An orthodontic appliance comprising a band securable about a tooth adjacent an area to be preserved, and including a pair of spaced axial parallel wire receiving tubes in axial alignment with the axis of said band and a space-maintaining member comprising a reversely bent wire having two side arms and a distal portion, said distal portion being arcuately bent to engage another tooth, said side arms each having an intermediate portion and a terminal portion, an equal number of horizontal convolutions in each of said intermediate portions, said convolutions being opposite and extending in opposed directions, said terminal portions each having a first upward bend and a second downward bend the latter being retained in said tubes, said terminal portions extending in a direction substantially normal to said intermediate portions and said intermediate portions extending in a plane substantially parallel with and below the occlusal plane of the teeth.

5. An orthodontic appliance as defined in claim 1, said convolutions in said side arms being opposed and extending outwardly in opposite directions whereby passage is provided for an erupting tooth.

6. An orthodontic appliance as defined in claim 1, said side arms each having an intermediate portion and a terminal portion, an equal number of horizontal convolutions in each of said intermediate portions, said convolutions being opposite and extending in opposed directions, said terminal portions each having a first upward bend and a second downward bend therein whereby said terminal portions extend in a direction substantially normal to said intermediate portions and said intermediate portions extend in a plane substantially parallel with and below the occlusal plane of the teeth.

7. An orthodontic appliance as defined in claim 1, wherein said securing means comprises a pair of tubes secured to said band.

8. An orthodontic appliance which comprises a band for a first tooth, said band having securing means including a pair of tubes rigidly secured thereto, said tubes extending upwardly and spaced apart a predetermined distance, and a spacing maintaining member detachably secured to said band by means of said tubes, said spacing member including a convolutioned portion thereby being longitudinally adjustable to engage a second tooth whereby said teeth are maintained in spaced relation.

9. An orthodontic appliance as claimed in claim 8 wherein said space-maintaining member comprises a reversely-bent wire having a distal portion, and a pair of side arms, said side arms each including an intermediate portion and a terminal portion, said intermediate portion normally extending in a plane substantially parallel with the occlusal plane of said teeth, said terminal portion being inserted into one of said tubes of said securing means on said band, and said distal portion being adapted to be bent through a vertical plane whereby bending said distal portion extends said space-maintaining member to engage said second tooth.

10. An orthodontic appliance comprising a band adapted to be secured about a tooth adjacent an area to be preserved, securing means including a pair of spaced wire receiving tubes on said band, a space-maintaining member comprising a reversely-bent wire with two side arms and a distal portion, said distal portion being arcuately bent to engage a second tooth, said side arms each having at least one convolution therein and being turned down terminally and inserted into respective tubes on the band thereby detachably securing said space-maintaining member to said band.

11. An orthodontic appliance comprising in combination a band for a first tooth, a pair of substantially axially parallel tubes on the outer surface of said band and a space-maintaining member, said space-maintaining member comprising a reversely bent wire having two side arms and a distal portion, the later being arcuately bent to engage a second tooth, said side arms each having at least one convolution therein and a terminally turned-down portion inserted into one of the tubes of said pair, the distance between said tubes being substantially equal to the distance between said turned-down portions of the side arms and said turned-down portions having a length exceeding that of the length of the tubes and projecting thereform, whereby upward bending of said projecting portions rigidly secures said space-maintaining member to said band.

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