July 9, 1963 H. A. TRAIGER 3,096,584

UNILATERAL ORTHODONTIC DEVICE FOR REPOSITIONING A MOLAR TOOTH

Filed March 31, 1959 2 Sheets-Sheet 1

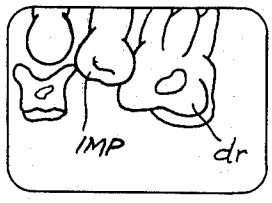

FIG. 1

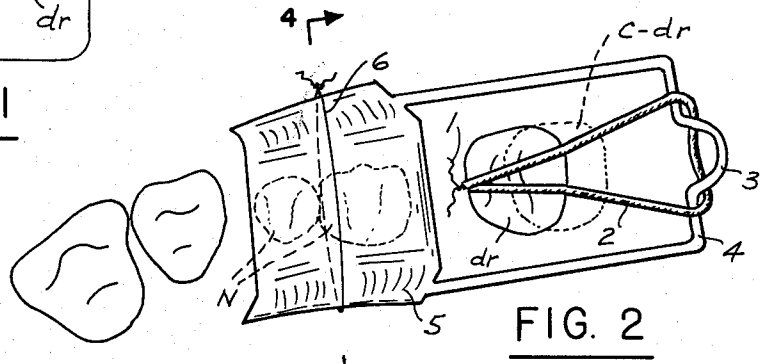

FIG. 2

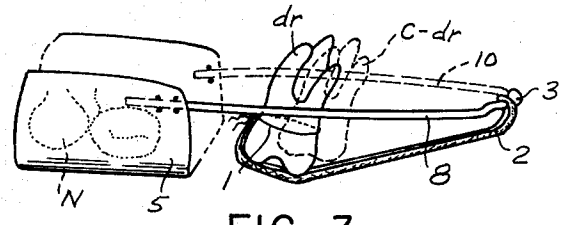

FIG. 3

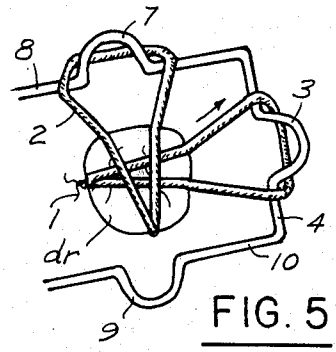

FIG. 5

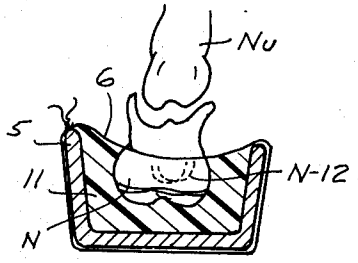

FIG. 4

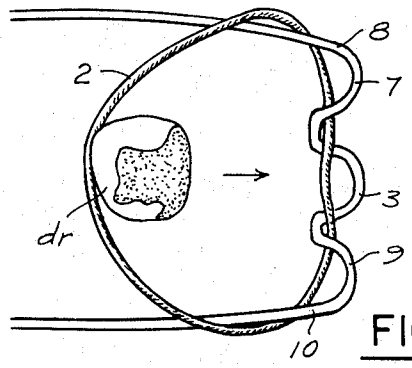

FIG. 6

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UNILATERAL ORTHODONTIC DEVICE FOR REPOSITIONING A MOLAR TOOTH

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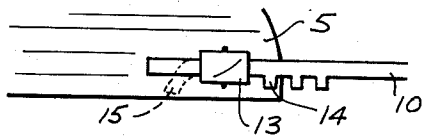


FIG. 7

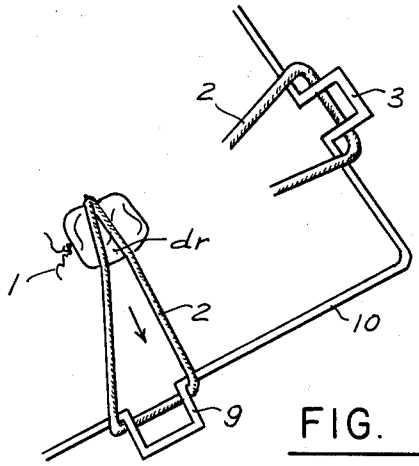


FIG. 8

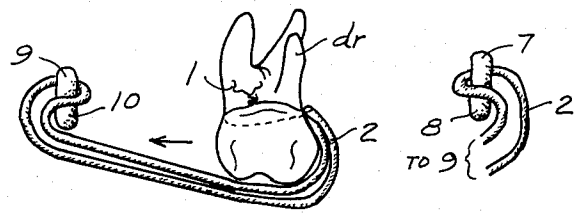
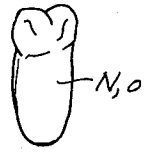


FIG. 9



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3,096,584

UNILATERAL ORTHODONTIC DEVICE FOR REPOSITIONING A MOLAR TOOTH

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Filed Mar. 31, 1959, Ser. No. 803,137
7 Claims. (Cl. 32—14)

My invention relates to a device to be used in the art of orthodontics, a subdivision of dentistry. The invention makes possible the utilization of internal traction to correct the malposition of an individual permanent molar tooth.

As is well known, when a molar tooth assumes an irregular position in the human mouth the following conditions may occur; the occlusion may be disturbed, a deformity can be produced in the location or growth of the jaws, and a crowding of the other teeth may occur.

In conventional practice, when it is desired to change a position of a malposed molar, use is made of a spring or coils. In the Norwegian system a loose fitting, removable acrylic plate is specially relieved so that pressure will be borne exclusively against the tooth to be shifted. It will be noted that in all the above procedures a "push force" is employed. One or more valid objections or improvements to each of the aforementioned conventional devices can be ascertained from the summary of the nature and objects of my invention which are as follows:

My invention embodies a rigid, fixed or removable, prefabricated or individually constructed, unilateral device designed to utilize materials capable of producing a tractionable force in the mouth for moving a permanent molar tooth, in the same quadrant of the mouth as the device, to its best anatomical and functional position. In this connection, the device acts as an interceptive orthodontic appliance correcting incipient malocclusions in children. For adults, it will restore a molar tooth to the best axial inclination for supporting fixed or removable bridge-work.

One of the prime objects of my invention is to provide effective and controlled tooth movements in several directions, said movement being independently employed or jointly employed at will.

Another prime object of my invention is to produce a gentle, but continuous force, rather than an intermittent force, to move an offending molar. A tractionable material provides this continuity of corrective pressure.

A further object of my invention features a specially designed platform which speeds the time needed for correction by eliminating cuspal interference from a tooth in the opposing jaw.

Another object of my invention is that the dentist may elect to fix the device to the natural teeth. This prevents the patient from removing the appliance and protects against loss. In addition to the use of dental cementing materials, the dentist may insert a wire ligature for added support in retaining the applicance.

An object of my invention, of no minor consequence, is to reduce the tediousness that is usually connected with moving an individual molar tooth. Therefore, the construction and fitting of individual parts is largely eliminated. Minimum adjustments are needed, since the tractionable mechanism is self-adjustive. A dentist may employ a proper fitting appliance chosen from a prefabricated stock.

How these and many other objects are to be implemented will become apparent through a consideration of the accompanying drawings wherein:

FIG. 1 is a diagrammatic view of an X-ray of the upper left posterior area of the human mouth.

FIG. 2 is a top plan view of the apparatus in position in the left side of the mouth.

FIG. 3 is a perspective side view of the device in position in the left side of the mouth (buccal view).

FIG. 4 is a section at 4—4 of FIG. 2.

FIG. 5 is an enlarged, top view of the last portion of the apparatus as shown in FIG. 2, showing the effects of a modification.

FIG. 6 is the same view as above, showing another modification.

FIG. 7 is an exploded side view of a portion of the apparatus, showing still another modification by use of a tube.

FIG. 8 is the same view as FIG. 5, showing a portion thereof.

FIG. 9 is a diagrammatic view of the tooth movement shown in FIG. 8, as seen from the front of the mouth.

Upon reference to the drawings in detail, in FIG. 1 is shown a very common tooth disorder, whereby a molar tooth *dr* has drifted forward preventing a bicuspid tooth *imp* from erupting and reaching its proper position in the mouth. FIG. 2 shows my device in position correcting the tooth disorder described above. In the operation of the apparatus, a thin stainless steel ligature wire **1**, approximately .012 inch in diameter, holds the tractionable material **2** in position. The tractionable material may be a latex elastic band, ¼ x ⅜ inches in length, or the new elastic-thread ligature, and tiny, stretched coils can be used. While one end of the tractionable material is being held firmly to the front end (mesial surface) of the molar tooth, the remainder of the tractionable material goes over the top (occlusal) surface and is shown attaching to the distal attachment loop **3**, which is located on the distal aspect of the posterior mounting member or projectory **4**. The projectory comprises two brackets, and should be made of a heavy gauge wire, of at least .019 inch in diameter, and the attachment loops may be formed from it by stamping. The projectory is in turn connected by soldering, welding, spot-welding, or, as shown in FIG. 2, as a one-piece cast with the retention body **5**. Said one-piece casting converts the loops into solid posts. The retention body should be very rigid and may be constructed from the stamping or casting of stainless steel, 1/64 x 1/32 inch in thickness. Any chrome cobalt alloy will be suitable, as well as acrylic, of greater thickness, or any dental plastic capable of being flasked and molded. The retention body is generally channel-shaped and supports the device by being cemented to a grouping of natural teeth N. The two brackets forming the projectory extend from one end of the retention body. This cementing procedure may be elective when the device used is of a custom-made all-metal or all-dental plastic type, whereby the device is constructed from impressions made of an individual patient's mouth. Another elective procedure to gain additional retention is to pass a ligature wire **6** under the interproximal contact point, formed by the contact of the natural teeth, and secure it around the retention body by means of twisting the ends into a knot with a dentimeter. In FIG. 3 it can be seen that not only does the tractionable material **2** move the drifted tooth *dr* back, but since the tractionable material pulls against the top (occlusal) surface of the drifted molar, there is a definite force set up to move the drifted molar upwards (apically) as well. This upward displacement of the molar is possible because the distal attachment loop **3** is higher than the occlusal third of the drifted tooth. The dotted outline of a molar tooth *c-dr* shows the drifted molar's forward displacement and elongation, corrected by means of the device. Also shown in FIG. 3 is the means of attaching the projectory (**10**, lingual aspect) by directly spot-welding it to the retention body **5**. It is desirable, for purposes of a modification made clear in FIG. 6, to have the posterior projectory (**10**;

9, buccal aspect) on a level with the base of the interdental papillae of the gingivae, at least until the projectories reach an area near the distal attachment loop 3. FIG. 4 illustrates how anchorage is achieved by the retention body 5, which gains its support from the natural teeth N, and even some displacement resistance from the unerupted natural tooth N*u*. When the apparatus is of the pre-fabricated type, a cementing bond 11 is necessary. For that purpose any good grade zinc phosphate cement or quick-setting dental plastic cement will suffice. A feature, which adds to the positive retention of the apparatus, is shown, whereby a thin ligature wire 6 is passed above (below, in the lower jaw) the contact point N–12 of the natural anchor teeth N and continues to engage the outside surface of the retention body so that when the ends of the ligature wire are twisted together, the wire completely encompasses the retention body and a positive lock is obtained. Another object of the invention is shown in FIG. 4. The retention body 5 sets over the natural anchor teeth N and prevents the teeth of the upper and lower jaw from meeting. This is very advantageous, since the drifted molar *dr* can reposition itself without interference from the cusps of the opposing tooth. The patient learns to adjust to chewing on the occlusal (top) surface of the retention body 5. In FIGURE 5, an alteration of the design of the projectory is shown, which makes it possible for the invention to treat four or five additional malpositions that a molar can assume. The first alteration noted is the buccal attachment loop 7 formed from the buccal aspect of the posterior projectory 8. When an elastic 2 is attached to the lingual surface of a malposed molar *dr*, whose condition is described as lingual cross-bite, by a thin ligature 1 and the rest of the tractionable material 2 crosses over the occlusal surface of the molar until it is attached to the buccal attachment loop 7, we will find that the traction set up will force the malposed tooth toward the buccal attachment loop, thus correcting the lingual crossbite disorder mentioned above. In addition, as shown in FIG. 5, a second elastic or tractionable material 2 may be stretched from the mesial (front) surface of a malposed molar and inserted on the distal attachment loop 3 of the distal aspect of the posterior projectory 4. With both of these tractionable materials exerting their forces simultaneously, a malposed molar will move in the approximate direction indicated by the arrow. The movement, being a combination backwards, cheekwards, and rootwards movement, has application in the correction of a malposed molar in lingual crossbite which has also drifted forward. The lingual attachment loop 9 of the lingual aspect of the posterior projectory 10 is shown, but their functions will be illustrated in FIGS. 8 and 9. The attachment loops may be formed by stamping or bending the projectory, and by a one-piece casting.

In FIG. 6, another modification is shown which embodies the objects of my invention to move a drifted, but "broken down" molar. In this case, the modification makes it possible to treat a malposed molar that cannot have the tractionable agent ligated to it. Thus, a badly carious molar or one that is partly covered over by gum tissue, can still be restored to the best anatomical position. Essentially, in this modification, the buccal attachment loop 7 of the buccal aspect of the posterior projectory 8 is located more to the distal back, as is the lingual attachment loop 9 of the lingual aspect of the posterior projectory 10, close to the distal attachment loop 3, as shown in the drawing. Three distinct factors make this modification a very efficient guidance system: first, the grouping of the attachment loops mentioned above; second, the setting of the posterior projectory (buccal and lingual aspects) at a level with the base of the interdental papillae of the gingivae, as shown in FIGS. 3 and 9; and third, a convergence of the posterior projectory (buccal and lingual aspects) towards the distal (back), as illustrated in FIG. 6. The guidance system, aforementioned, is important to prevent the tractionable material from crawling rootwise and denuding portions of the molar, while the convergence of the projectory makes it possible for the tractionable agent to be exceptionally self-adjustive and glidible. The arrow shows the drifted, but unligatible molar *dr* being driven backwards during treatment. It is pointed out here that the modification described in conjunction with the FIG. 5 drawing can be used for an unligatible molar, but traction force, range of movement, and glidibility of the tractionable agent are reduced.

FIG. 7 presents an embodiment whereby the posterior projectory is made detachable from the retention body by means of metallic tubes or brackets. Essentially, as shown in the drawing, the posterior projectory (the lingual aspect 10 is only shown) is passed through a tight-fitting tube 13, which is attached to the outer surface of the retention body 5 by soldering, welding, or spot-welding. To prevent the projectory from sliding forward, a stop spur or spurs 14 are added by soldering, welding, spot-welding, or one-piece casting with the projectory. To prevent the projectory from sliding off, an end-bend 15 is made. However, should the tubes be placed on the innermost surface of the retention body, the projectory will be stabilized against accidental displacement by the gripping action of the phosphate or dental plastic cement, doing away with the need for stop spurs or end-bends. Thus, the embodiment described above makes it possible for a single retention body unit, possessing this detachable feature, to attach to a projectory chosen from a wide selection of types and lengths.

As previously noted FIG. 8 is part of the same view as in FIG. 5. A separate drawing is presented to show additional molar movements that are possible with the use of this modification. For instance, as shown in the drawing, the malposed molar *dr* may have a ligated (1) tractionable agent 2 stretched from the buccal surface of the malposed molar to the lingual attachment loop 9 of the lingual aspect of the projectory 10. This arrangement would move the molar, as indicated by the arrow towards the lingual attachment loop 9. Such movement is desirable to correct a condition of a molar known as buccal crossbite. This condition is illustrated in FIG. 9 by the position relationship of the malposed molar *dr* and the opposite molar in the lower jaw N, *o*. A molar, in buccal crossbite, may also drift forward, and to correct this condition a second tractionable agent should be stretched from the mesial (front) surface of a malposed molar and inserted on the distal attachment loop 3. This second tractionable agent is precisely shown in FIG. 5 and indicated, but partly drawn, in FIG. 8.

FIG. 9 also indicattes how a tractionable agent may be stretched from the buccal attachment loop 7 of the buccal aspect of the projectory 8 over the occlusal (top) surface of any elongated molar *dr* and inserted on the lingual attachment loop 9 of the lingual aspect of the projectory 10. The tractionable force used to depress the overlong molar should be very mild.

The posterior projectory may be differentiated from a bow or an archwire because it is passive, and by itself, does not influence tooth position.

While I have described specific embodiments of my invention it is apparent that changes and modifications may be made therein without departing from the spirit of my invention.

I claim:

1. An intra oral total traction orthodontic device for correcting malpositioned teeth, said device comprising an elongated substantially rigid channeled retention body fittable with its base upon the top surfaces of a grouping of natural anchor teeth lengthwise thereof, a substantially rigid mounting member extending from one end of said retention body substantially in alignment therewith, said mounting member having two brackets extending from the side walls of said retention body to straddle the flanks of

at least one malpositioned tooth without contact therewith, attachment means on said mounting member, and an elastic ligature releasably attachable to said attachment means, said ligature being placeable upon the malpositioned tooth to exert traction upon the same towards the point of attachment of the ligature on the mounting member.

2. An orthodontic device according to claim 1 wherein said attachment means comprise several spaced apart members provided on said mounting member for attaching at least one ligature to a selected one of said attachment members.

3. An orthodontic device according to claim 2 wherein each of said attachment members is in the form of a projection protruding from said brackets.

4. An orthodontic device according to claim 1 wherein the free ends of said brackets are joined by a cross bar to form a closed frame of generally U-shaped configuration and wherein several spaced apart attachment members are provided on said brackets and said cross bar.

5. An orthodontic device according to claim 1 wherein said brackets are secured to said retention body lengthwise slidable in reference to the side walls thereof, and

means for locking said brackets in selected lengthwise positions in reference to the retention body to vary the effective length of said brackets.

6. An orthodontic device as set forth in claim 1, wherein said retention body comprises a channel-shaped prefabricated plate, and cement for anchoring said retention body upon said grouping of natural anchor teeth.

7. An orthodontic device as set forth in claim 1, further comprising a ligature for securing said retention body upon said grouping of natural anchor teeth, said ligature passing around said retention body and being extendable through a point of contact of adjacent anchor teeth.

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