April 22, 1969 T. E. PERKOWSKI 3,439,421

METHOD OF MAKING ORTHODONTIC APPLIANCES

Filed Jan. 9, 1967 Sheet 1 of 3

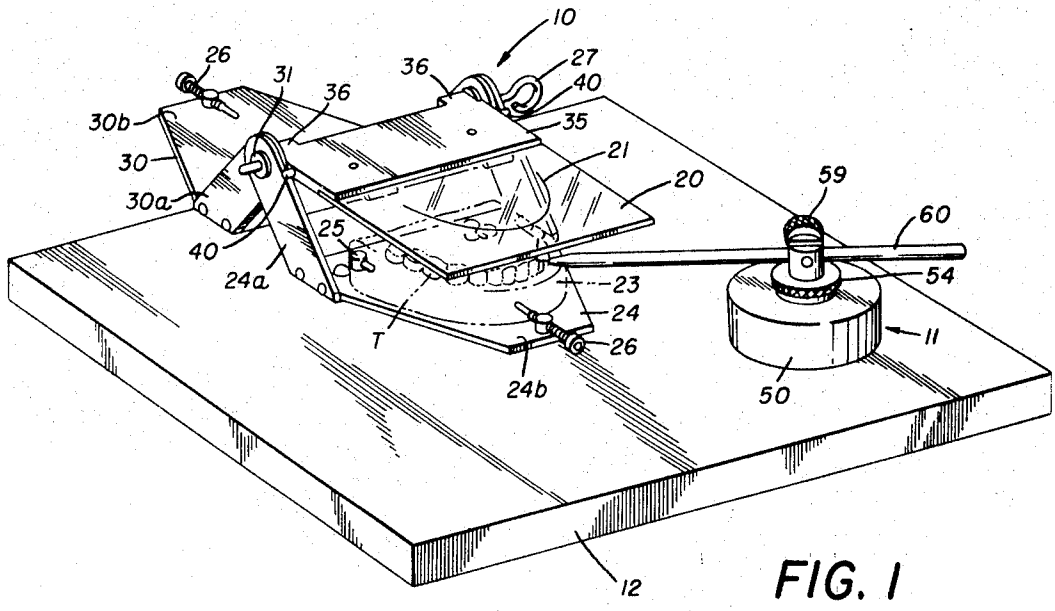


FIG. 1

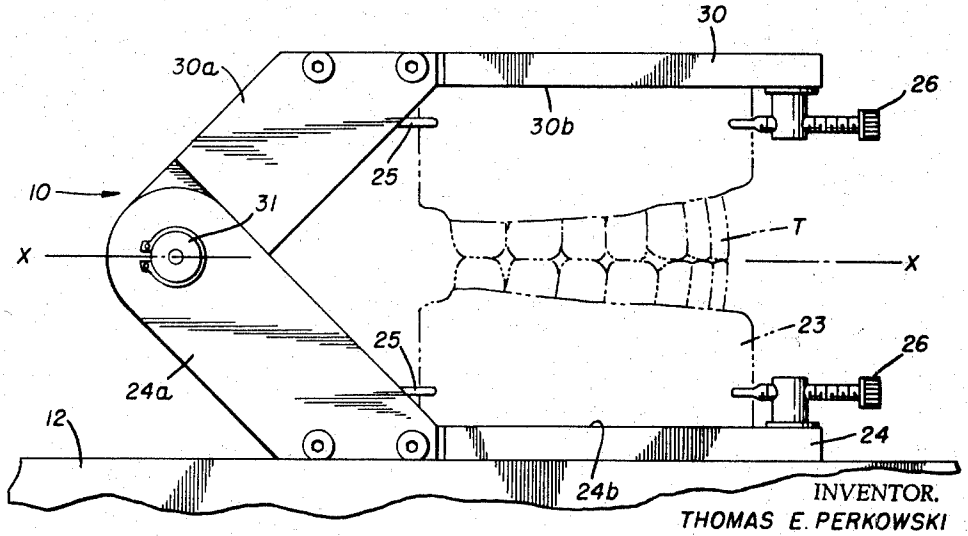


FIG. 2

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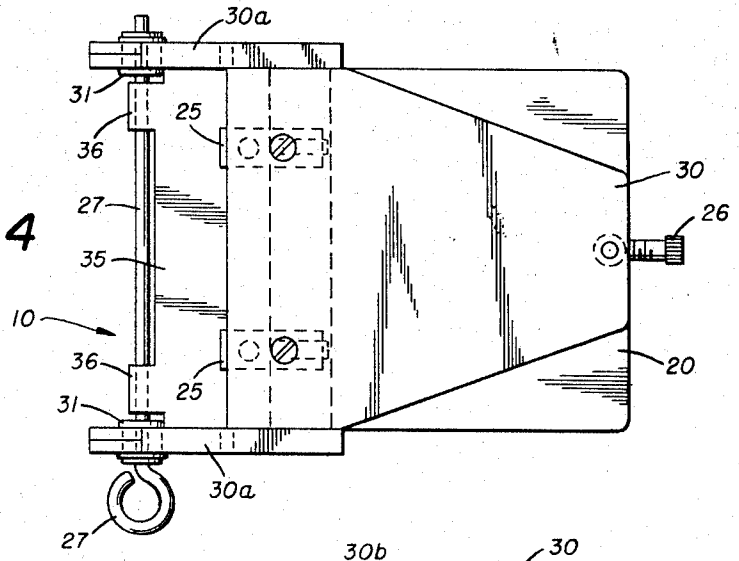
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FIG. 4



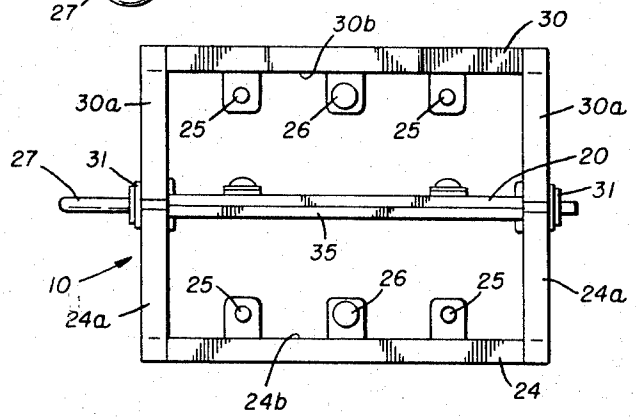


FIG. 5

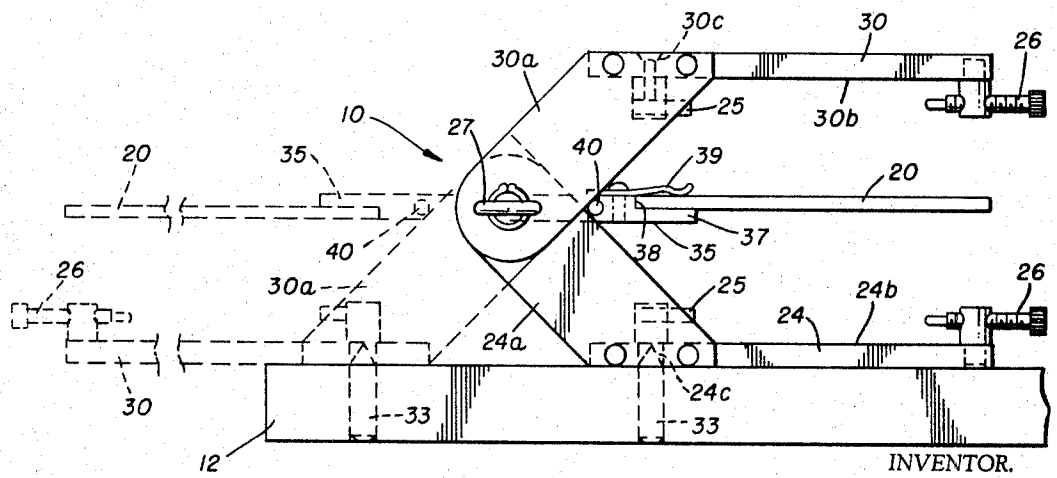


FIG. 3

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METHOD OF MAKING ORTHODONTIC APPLIANCES

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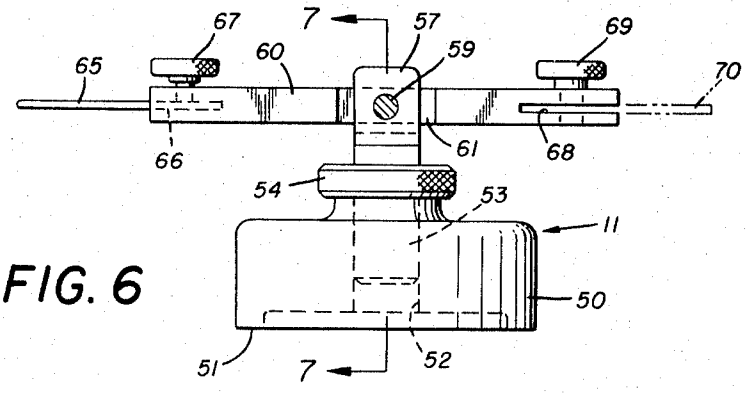


FIG. 6

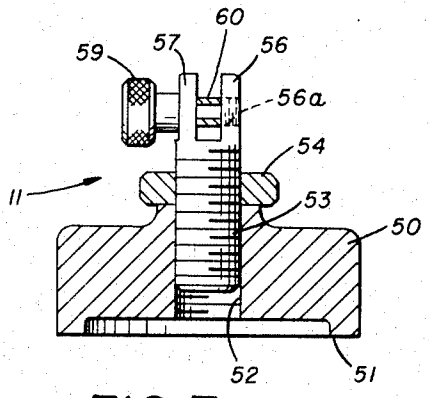


FIG. 7

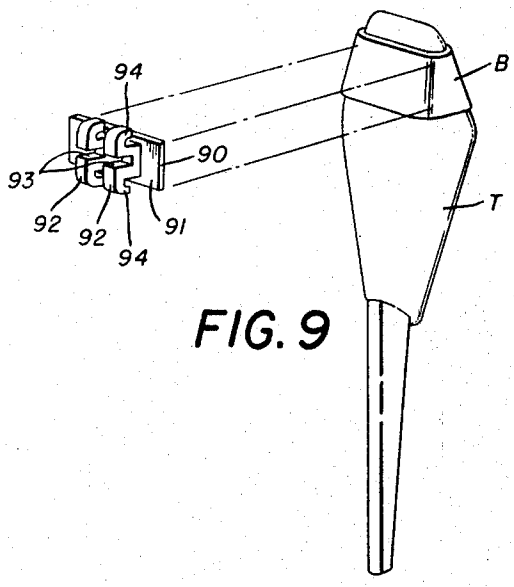


FIG. 9

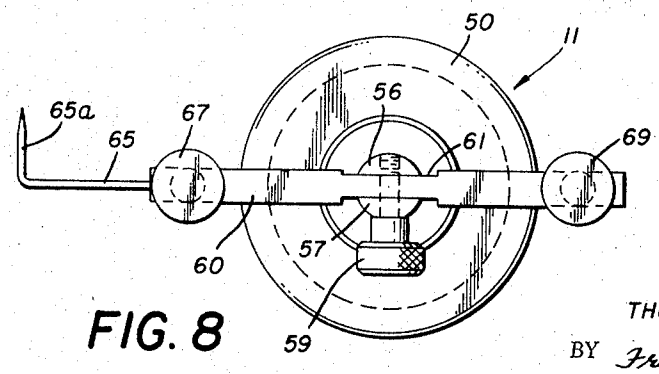


FIG. 8

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3,439,421

METHOD OF MAKING ORTHODONTIC APPLIANCES

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Filed Jan. 9, 1967, Ser. No. 614,381
Int. Cl. A61c 7/00
U.S. Cl. 32—14 2 Claims

ABSTRACT OF THE DISCLOSURE

An indirect method of fabricating bands and appliances for corrective orthodontic situations. An impression casting of the patient's mouth is separated and rearranged on the articulator beneath a preselected arch form diagram that has resulted from earlier diagnoses. Bands are formed on the separated individual dies and the brackets are then applied to the casting by a bracket positioning gauge that moves across the surface table supporting the articulator so as to be parallel to the occlusal plane. Treatment wires are then preformed for engagement with the band brackets. These wires are then used to complete the orthodontic treatment.

Field of the invention

This invention relates to the field of orthodontic appliances and further relates to a specific form of articulator and bracket positioning device that permits a new and improved method of indirect fabrication of orthodontic appliances to be achieved.

Description of the prior art

No prior patent art is known to the applicant relating to this subject.

The practical state of the prior art known to the applicant relates principally to a method of fabricating and applying orthodontic appliances by what is known as the "direct" method.

Under the "direct" method of fabricating orthodontic appliances an impression is first taken of the patient's existing teeth structure. Based on this impression as well as X-rays, the orthodontist is normally enabled to determine the course of corrective action that must be taken. Normally bands are then positioned around the individual teeth with brackets then being positioned on the bands so as to permit the bands to be interconnected together by a spring wire with the result that repositioning force is constantly exerted on the teeth in an effort to realign them into a proper condition of registry with each other.

Also existent in the prior art is a method of fabrication known as the "indirect" method wherein the bands are first applied to a rigid replica of the patient's teeth and then fitted individually after being fabricated on the die replica.

In both the "direct" and "indirect" methods of application above described bracket positioning is done on a cut and try basis with the result that the brackets are rarely if ever positioned in the proper condition of alignment that would result in maximum utilization of the spring forces. Further, there is no set goal that has been established by these methods with progress being determined by constant examination and the exercise of orthodontic skill directed towards achieving the optimum condition of correction.

Summary of the invention

Applicant has discovered an improved orthodontic result can be achieved by using an articulator that permits reassembly of the patient's teeth into a desired form of realignment under an "arch plate" that is utilized with the articulator to effectuate such realignment.

Applicant has further discovered that if a bracket positioning guage is employed in connection with such articulator that all brackets will be positioned in a parallel with the occlusal plane with the result that perfect alignment is achieved in every instance of fabricating an orthodontic appliance. Applicant thus deviates from standard practice by fabricating the orthodontic appliance on the basis of the ideal condition to be achieved rather than on the condition of initial treatment as has been the case in prior art.

Brief description of the drawings

FIGURE 1 is a schematic view showing the improved articulator, bracket, retaining catch and surface table that are employed in the practice of the invention.

FIGURE 2 is a side elevational view showing a complete set of teeth ready for application of the orthodontic bands.

FIGURE 3 is a similar side elevational view of the improved articulator with the glass plate positioned therein.

FIGURE 4 is a top plan view of the improved articulator.

FIGURE 5 is an end elevation of the improved articulator.

FIGURE 6 is a side elevation of the bracket applying gauge.

FIGURE 7 is a vertical section taken on the lines 7—7 of FIGURE 6.

FIGURE 8 is a top plan view of the improved bracket applying gauge.

FIGURE 9 is a schematic view illustrating the manner of applying the brackets to the orthodontic bands.

Description of the preferred embodiment

Referring now to the drawings and in particular to FIGURE 1, the improved apparatus for fabricating orthodontic appliances includes an articulator **10**, a bracket applying gauge **11** and a surface table **12** with the arrangement being such that the articulator **10** is used for the purpose of creating a replica of the patient's teeth as they will exist at the conclusion of orthodontic treatment. The surface table **12** serves to provide a common plane over which the bracket applying gauge may be freely moved for the purpose of locating the wire engaging brackets (not shown) on the teeth T that are positioned on the articulator **10**.

Before proceeding with a detailed description of the articulator **10** per se it is believed in order to first describe the manner in which the teeth T are positioned in the form shown in FIGURES 1 and 2.

To this end the articulator **10** includes a transparent plate **20** preferably of glass that has penciled thereon the arch forn line **21** that has resulted from the orthodontist's diagnosis of the patient's particular case. In reality the line **21**, which is arch shaped as shown, is plotted from the X-rays and study models that have been taken at the commencement of patient treatment and as a result it shows the ideal arch line within which the teeth should be aligned following orthodontic treatment.

In practicing the invention an impression is first taken of the malposed teeth and this impression is then poured up in epoxy resin in the usual fashion to create a molded replica of the teeth as they actually exist at the commencement of treatment.

With the biting surface of the teeth facing down and the impression surface being up from the standpoint of access, dowels are then positioned in the individual teeth which are then separated as by sawing.

The bands are then formed on each individaul die or tooth replica. A wax horseshoe **23** (FIGURE 1) is then placed on the lower hinged member **24** to accept and temporarily position the dowels of the individual dies. The horseshoe **23** is held in place by the posterior pins **25**, **25** and the retractable anterior pin **26** as clearly shown in FIGURE 1.

Using the arch line **21** as a guide the orthodontist or technician then positions the teeth directly below the arch line by forcing the dowel into the wax horseshoe which temporarily aligns the teeth in the correct position.

When the complete arrangement of lower teeth has been accomplished as shown in FIGURE 1 a wax dam can be formed in encircling relation with the set up teeth to thus allow pouring of a plaster index so as to stabilize the teeth in the position of parallelism with the occlusal plane X—X as clearly shown in FIGURE 2 of the drawings, with the occlusal plane X—X being coplanar with the bottom of the glass plate **20** as clearly shown in FIGURE 3 of the drawings.

When the lower teeth have been realigned as just described into aligned relationship with the arch line **21** the upper teeth can be made similarly by opening up the articulator to the position shown in FIGURE 1 and repeating the process just described with it being noted that in this instance the glass plate member **20** will be removed by withdrawing hinge pin **27** so as to permit the upper teeth to be positioned with relationship to the lower teeth as clearly shown in FIGURE 2.

In this regard it will be noted that the fact that the lower teeth have been set to the proper arch form automatically serves as an aligning template for the upper arch form.

When the upper and lower teeth have been realigned as just described the orthodontist or technician will then commence to apply the brackets to the individual bands. In this regard bracket positioning is achieved by using wax to initially locate the bracket on the band with the band then being removed so that the bracket may be permanently spot welded to the same by conventional practice.

Because of the fact that the bracket applying gauge has a bottom surface that is copolanar with the surface plate table **12** it is manifest that all brackets will be applied in a condition in which their longitudinal length is parallel to the occlusal plane X—X as well as the surface table **12**. Following this it is a relatively simple matter to preform the connecting wires that interconnect the respective brackets and when this has been done the brackets are ready for positioning on the patient's teeth with it being apparent that when such positioning has been achieved that application of the corrective wires will tend to urge the patient's teeth towards the position that exists on the orthodontic model that has been created as a replica of the ideal final form of tooth positioning.

Referring now to FIGURE 3 for a more detailed description of the articulator **10** it will first be noted that the same includes a lower hinge member **24** and an upper member **30** with the 45 degree arm extensions **24***a* and **30***a* thereof being respectively journalled about a pair of hinge bushings **31**, **31** as to permit movement between the full and chain dotted line positions that are shown in FIGURE 3.

As earlier indicated, each of the hinge plates includes a setup supporting surface **24***b* and **30***b* with the upper and lower plaster indices being held in place with respect to these surfaces by the posterior pins **25**, **25** and the retractable anterior pin **26**.

Locating apertures **24***c* and **30***c* are provided in the actual face of the plate members **24** and **30** respectively for the purpose of coacting with locating pins **33**, **33** that extend upwardly from the surface table **12** as clearly shown in FIGURE 3 of the drawings. The purpose

of this pin in hold position is merely to obviate movement of the articulator during the time that the brackets are being positioned as has earlier been described.

As has been indicated before, a glass plate **20** is removably associated with the articulator **10** for the purpose of associating the particular arch form line of a patient with the articulator for the purpose of rearrangement of tooth locations as has been previously described. To this end plate member **35** has rearwardly extending boss members **36**, **36** that are journalled about hinge pin **27**, with the hinge pin **27** being inserted through appropriate openings that are provided in the hinge bushings **31**, **31**.

In this fashion the hinge plate **36** as well as the components associated therewith can be quickly removed by merely withdrawing the hinge pin **27**.

In order that the plate **20** may be quickly changed, the right hand end **36** of the plate **35** is notched as at **38** (FIGURE 3) with a spring clip **39** tensionally overlying the notch so as to releasably hold the plate **20** in place as is clearly apparent from FIGURE 3 of the drawings.

Finally locating stop pins **40**, **40** are provided in projecting relationship to the side edges of the plate member **36** so as to limit the pivotal movement of the plate **36** to the 180 degree arcuate pivot that is shown existing between the full and chain dotted line positions of FIGURE 3 with the pins bearing against the arm members **24***a*, **24***a*, and **30***a*, **30***a* as is clearly apparent.

Turning now to FIGURES 1 and 6 through 8 for a detailed description of the bracket applying gauge **11** it will first be noted that the same includes a base portion **50** that has a perfectly flat lower surface **51** that is designed to be in coplanar relationship with the work surface of the surface table **12**. A central threaded aperture **52** is further provided in the base **50** for reception of a post **53** with the lower end of the post **53** being threaded for engagement with an interiorally threaded ring **54**. By this arrangement the post **53** may be raised or lowered with respect to the base by merely rotating the ring **54** with this arrangement permitting fine adjustment of the height plane of the gauge **11**.

As shown in FIGURE 7 the upper end of post **53** is bifurcated to define opposed legs **56** and **57**, with the leg **56** having a tapped aperture **56***a* while the leg **57** is bored so as to permit passage of the shank portion of a tightening screw **59**.

A rigid bar **60** is carried by gauge **11** and has a flattened center section **61** which is adapted to be received between the faces of the leg members **56** and **57** as clearly shown in FIGURES 6 and 7 of the drawings, with the flattened portion **61** being appropriately bored so as to permit passage of the shank portion of locking screw **59**.

A bracket holding pin **65** is received in a socket **66** that is provided at one end of the bar **60**, with the pin **65** being held in place by screw **67** as clearly shown in FIGURE 6 of the drawings.

The pin **65** preferably has therein a right angle portion **65***a* that is designed to engage with portions of the bracket so as to permit mounting of the same as clearly shown in FIGURE 9 of the drawings.

An additional slot **68** may be provided in the opposite end of bar **60**, as shown in FIGURE 6, so as to permit insertion of another type of pointer so as to make the gauge double-ended in operation with a similar screw **69** being used to retain the pointer **70** or other element in place within the socket.

By the arrangement just described it will be noted that the bar **60** may pivot around the axis of the shank portion of the screw **59** until such time as the screw **59** is tightened in place. At this time any movement of the gauge **11** with regard to the surface table **12** will not change the height of the pin **65**, with the result that all brackets will be applied at an identical spacing from the occlusal plane so as

to be coplanar and longitudinally aligned with each other in end-to-end relationship.

FIGURE 9 illustrates schematically a typical bracket member **90** that is to be mounted on band B which encircles tooth T. The bracket member **90**, that is illustrated has a thin flat welding flange **91** as well as a pair of wire receiving members **92, 92**. Each member **92** includes a central slot **93** within which the treatment wires may be inserted. By this arrangement ligature wires can be used in known fashion on hooked portions **94, 94** to retain the treatment wires in place with respect to the bracket slot **93**. It is also to be understood that the invention is not restricted to any particular form of bracket. In other words, all forms of brackets are equally capable of being used with the bracket applying gauge **11**.

As has been indicated earlier, the bracket positioning gauge **11** serves to perform the very important function of arranging the brackets in coplanar relationship on the respective bands and this arrangement clearly facilitates the effective use of the treatment wires. Specifically, the treatment wire may be formed to fit the contour of the assembled set up of teeth, bands and brackets. By this arrangement a progressive series of treatment wires of increasing rigidity can be precisely preformed to conform to the arch form that has been established as well as the individual tooth to tooth relationship that has been recreated in the final desired form on the set up.

By this arrangement, when the bands are positioned on the patient's teeth and the treatment wires positioned therein, these treatment wires are always seeking to move the teeth towards the desired end result in view of the memory and resiliency property of such wire.

It will be seen from the foregoing that there has been provided a new and improved type of orthodontic articulator and bracket applying gauge that permits improvement and a degree of accuracy in orthodontic treatment.

It has been shown how this orthodontic articulator differs from the prior art in that it provides a replica of the patient's mouth in the corrected form rather than a replica of the patient's mouth at commencement of treatment.

It has further been shown how the bracket applying gauge insures maximum accuracy in that all brackets are arranged in end-to-end relationship in a plane that is parallel to the occlusal plane.

Finally, it has been shown that the improved orthodontic articulator permits attainment of an orthodontic procedure wherein the orthodontist is working towards a given end.

What is claimed is:

1. A method of making orthodontic appliances comprising the steps of:

(A) cutting an impression molding of a patient's malformed teeth into individual tooth dies;

(B) resetting said tooth dies in registry with a prescribed arch form diagram;

(C) banding said reset dies while the same are in said reset position; and

(D) attaching brackets to said bands in substantially coplanar relationship with each other.

2. The method of claim **1** further characterized by the step of preforming and attaching the arch wires to said brackets while said teeth are in said reset position.

References Cited

UNITED STATES PATENTS

2,467,432	4/1949	Kesling	32—14
2,775,036	12/1956	Kesling	32—14
3,316,640	5/1967	Kesling	32—14

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