Oct. 20, 1942. J. C. TAYLOR, JR 2,299,285

MAXILLARY MANDIBULAR RELATER

Filed Oct. 7, 1941

Fig. 1.

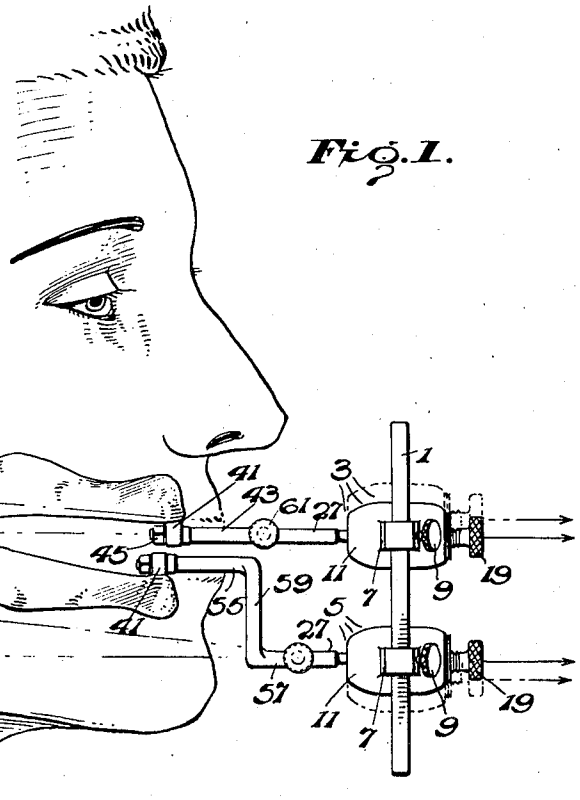


Fig. 2.

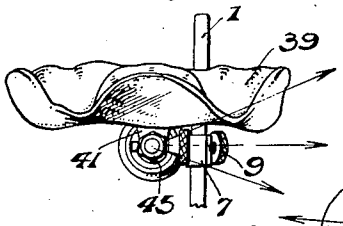


Fig. 3.

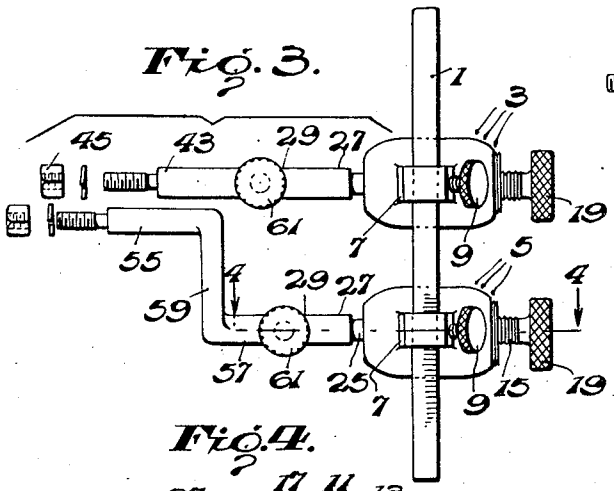
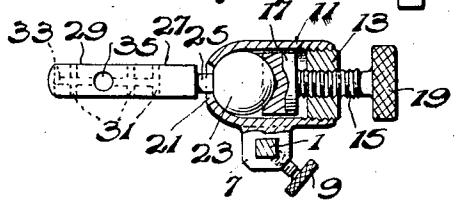


Fig. 4.



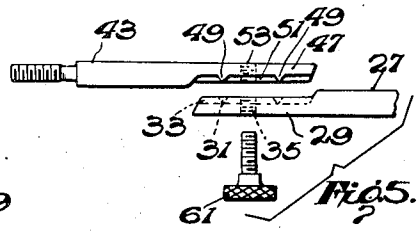


Fig. 5.

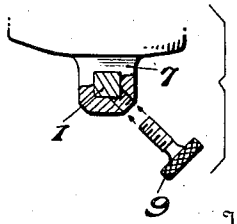


Fig. 6.

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UNITED STATES PATENT OFFICE

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MAXILLARY MANDIBULAR RELATER

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Application October 7, 1941, Serial No. 414,016

3 Claims. (Cl. 32—17)

This invention relates generally to the art of dentistry, and particularly to a method and apparatus for use in the dentist's office and in the dental laboratory in the making of artificial dentures.

In its more specific aspects this invention relates to a method and apparatus employed in the making of artificial dentures, resulting in accurate occlusion in the finished denture when in use by the patient.

It is therefore a prime object of this invention to provide a method and apparatus for use in the manufacture of artificial dentures resulting in exceedingly accurate occlusion of the finished denture.

It is a further object of this invention to provide a method and apparatus for manufacturing artificial dentures in which the relative relationship of the mandibular and maxillary ridges when in relaxed normal position is accurately determined and recorded.

Another object of my invention is to provide a method and apparatus for manufacturing artificial dentures in which the correct relationship of the mandibular to the maxillary ridge is determined and retained without requiring the usual "bite" impression.

It is a further object of my invention to provide a method and apparatus for manufacturing artificial dentures in which "snap" impressions are utilized instead of the usual "bite" impressions.

A further characteristic of my invention is to provide a method and apparatus for manufacturing artificial dentures in which the case is mounted on an articulator directly from the impressions.

A still further object of my invention is to provide a method and apparatus for use in the manufacture of artificial dentures whereby trays made from "snap" impressions of the mandibular and maxillary ridges may be disposed in the patient's mouth and the relative relation of such trays recorded by apparatus disposed externally of the patient's mouth.

A further object of this invention is to provide an apparatus for use in the manufacture of artificial dentures, whereby trays may be mounted on the apparatus and positioned thereon to assume the same relationship as the mandibular and maxillary ridges assume when the patient is in relaxed position.

And yet another object of my invention is to provide an apparatus for use in the manufacture of artificial dentures whereby the case may be set on the usual articulator in exact duplication of the angular disposition of the mandibular and maxillary ridges with respect to one another when the patient is at rest.

With the foregoing general objects, features, and results in view, as well as certain others which will be apparent from the following explanation, the invention consists in certain novel features and design, construction, mounting and combination of elements, as will be more fully and particularly referred to and specified hereinafter.

Referring to the accompanying drawing:

Fig. 1 is a view in elevation of the apparatus in position with the trays disposed in the patient's mouth.

Fig. 2 is a rear view in elevation of one of the trays.

Fig. 3 is a view in elevation of the apparatus with the trays detached therefrom.

Fig. 4 is a view taken on the line 4—4 of Fig. 3.

Fig. 5 is a view in elevation of the relater and connecting rods in detached position.

Fig. 6 is a horizontal section showing the vertical adjusting means for the trays.

In the manufacture of artificial dentures it is necessary to determine with as much accuracy as possible the relationship of the mandibular to the maxillary ridge in order to obtain correct occlusion in the finished denture. If this relationship or relative angular disposition of the mandibular and maxillary ridges is not accurately determined malocclusion of the finished denture results with the consequential discomfiture to the user thereof. Under techniques now in common use in the preparation of artificial dentures it is exceedingly difficult to determine with any degree of accuracy the proper or true relationship of the mandibular and maxillary ridges, and therefore there is great dissatisfaction among users of artificial dentures because of malocclusion of the denture sets.

To determine this mandibular-maxillary relationship it is now common practice to have the patient bite into some soft substance such as wax, or against bite rims, to obtain impressions of the gums of the patient. The use of such "bite" impressions causes many misfit dentures because the true, normal relationship of the mandibular and maxillary ridges is not obtained. When the patient is required to bite into such soft substance the muscles of the jaws tend to force the mandibular out of its normal position, either unilateral or bilateral protrusion thereof resulting. A further disadvantage in the use

of "bite" impressions resides in the fact that in the act of biting against the recording substance the tissues of the ridges are compressed, and furthermore the "bite" impressions are usually warped either from heat of the mouth or from improper handling. Now the fact that in the act of biting the patient is not relaxed and the mandibular-maxillary relationship is not normal, and the further fact that in biting the ridge tissues are compressed, plus the warping of the "bite" impressions, result in unbalanced occlusion in the finished denture.

I have devised a method and apparatus for use in the preparation of artificial dentures which solves the problems which are inherent in the methods now known and in general use. It is a well established fact that the mandibular and maxillary ridges are in correct or normal position when the muscles are at rest, and that the act of biting causes a muscle reaction resulting in an upsetting of the true and normal angular disposition of the ridges relative to one another. By my method and apparatus I have completely eliminated the necessity of taking a "bite" impression, which, as I have stated is the underlying cause of malocclusion in dentures. Instead I take a "snap" or preliminary impression of the mandibular and maxillary ridges, such "snap" impression need not be entirely accurate, and is used for building trays or the like for obtaining a more accurate and final impression.

From "snap" impressions, made while the mandibular and maxillary ridges are at rest, plaster models are made, and from such plaster models base trays of rubber or the like material are made. It is to be understood that these base trays are models or casts of the "snap" impressions, and therefore are individually formed, one set for each patient. When the base trays have been made and "washed" out with any suitable impression material the dentist or technician then makes use of my relater apparatus in correctly positioning the trays relative to each other prior to and when mounting them on an articulator, all as will be fully explained and made clear hereinafter. It is to be distinctly understood that the method and apparatus of this invention are utilized prior to the use of the usual articulator, that is, after the case is properly mounted on the articulator by means of my invention, the steps which follow are usual and now known and in use in the art.

By my method and apparatus it is now possible and practical to insert the casts or trays in the patient's mouth where they will assume the normal relationship of the mandibular and maxillary ridges, and when in such positions to attach them to my apparatus which when set and adjusted will capture and record such relative relationship of the trays, so that the trays may be detached from the apparatus for removal from the mouth and later attached again to the apparatus and thereby caused to assume again the exact relative relation which was present when they were disposed in the patient's mouth and attached to the appaartus.

The apparatus which I have devised, and which I shall hereinafter term the relater is provided for attachment to the upper and lower trays for capturing and recording the relative relationship thereof. Referring to the drawings, such relater comprises a post 1, which I shall hereinafter designate as the vertical post and which is preferably square in cross section.

Two universal joint or supporting units which are designated generally by the numerals 3 and 5 are adjustably mounted on and carried by the vertical post for independent relative movement therealong to change the spacing of the units on the post. Each of the supporting units 3 and 5 is adjustably mounted and carried on the vertical post by means of a square post receiving collar member 7, rigidly projecting from the unit which collar slidably receives the vertical post therethrough, a set screw 9 being threadedly received through each collar to engage, and when screwed into the collar to exert pressure against the vertical post to effectively wedge it within the collar thereby locking the unit against movement along the post.

As the structure and mode of operation of each universal joint or supporting unit is the same I shall only describe one of such units in detail. Referring particularly to Fig. 4 of the drawings it will be apparent that the unit includes a tubular like shell or socket 11, closed at one end by a plug 13 having a centrally disposed threaded opening therethrough for receiving therein a screw 15, on the inner end of which is mounted a cup shaped plunger 17 and on its outer end disposed externally of the socket is a knurled operating head 19. The opposite end of the tubular socket is provided with an aperture 21 concentrically arranged with respect to the socket and of smaller diameter than that of the body of the socket. A substantially spherical member or ball 23 is disposed in the socket between the plunger and the apertured end thereof and a stem 25 is formed on the ball to project rigidly therefrom through the aperture 21 in the socket. A connecting rod 27 forming an extension of the stem 25 and of relatively greater diameter than the stem is made preferably though not necessarily integral therewith. The outer end portion 29 of the connecting rod is cut away longitudinally of the rod to provide a semi-cylindrical female portion having a flat side which is provided with a plurality of transverse grooves 31 and an intersecting longitudinal groove 33. An internally threaded hole 35 is provided centrally of the female portion 29. As there are two supporting units and as the structure of each is the same it will be clear that there are two connecting rods projecting from the units radially of the vertical post.

As I have hereinbefore pointed out I utilize trays of rubber or the like material which are made from plaster models formed from the "snap" impressions of the ridges, and the mandibular or lower tray I shall designate by the numeral 37 and the maxillary or upper tray by the numeral 39. Each of such trays is formed with an eye or loop 41 on the mesial-labial thereof, preferably formed integrally therewith. A relater rod 43 is mounted on the upper tray to project forwardly therefrom. This relater rod extends through the eye 41 on the upper tray and is removably secured thereto by a nut 45 adapted to be screwed on the inner threaded end of the relater rod. The opposite or outer end of the relater rod is longitudinally cut away to provide a semi-cylindrical male portion 47 having a flat side which is provided with a plurality of transverse ribs 49, an intersecting longitudinal rib 51 and an internally threaded centrally disposed hole 53 therein. The lower tray 37 is provided with a relater rod which is removably fastened to the tray in the same manner as the straight relater rod 43 is removably

fastened to the upper tray, however the relater rod of the lower tray is bent to provide two spaced horizontal legs **55** and **57** and a perpendicular leg **59** connecting the horizontal legs. The outer horizontal leg **57** is cut away to provide a semi-cylindrical male portion having the same ribbed structure as the male portion **47** of relater rod **43**.

In the use of the apparatus, the trays with their relater rods projecting therefrom are adapted to be assembled with the relater device proper by attachment to the connecting rods which project from the units **3** and **5** radially from the post **1**, as disclosed particularly in Fig. 5 of the drawing. Such attachment is accomplished by positioning the female ends of the connecting rods adjacent the male ends of the relater rods for meshing of the grooves with the ribs of such ends respectively when the male and female ends are brought into engagement. The relater and connecting rods may then be rigidly locked together in axial alinement by disposing the screws **61** into the threaded holes **35** and **53** which are provided for this purpose in the male and female ends of the rods. With the relater and connecting rods attached and locked together in this manner it is clear that there can be no relative lateral or rotary movement therebetween. It is also to be understood that the bent or angular rod which projects from the lower tray is in meshing engagement with and detachably locked to the lower connecting rod in the manner outlined above.

When the trays have been formed from the plaster casts made from the "snap" impressions the relater rods are passed through the eyes on the trays and rigidly fastened thereto. As hereinbefore noted these trays are individually formed for the particular patient being fitted. The trays with the relater rods attached thereto are then placed in the mouth one at a time, the lower tray being positioned against the lower ridges and retained there by gravity and by suction for movement with the lower jaw, and the upper tray being fitted against the roof of the mouth and the upper ridges and retained there by suction developed between the roof of the mouth and the tray for movement with the upper jaw. In rare cases where it is not possible to obtain such suction a small amount of detal powder applied to the tray will hold it firmly in proper position. With the two trays disposed in the mouth as described the technician's hands are free to operate and set the device. It will be seen that the trays disposed and positioned in the mouth as described will assume with respect to one another the same relationship as that existing between the mandibular and the maxillary ridges. When the jaws of the patient are relaxed and in substantially normal, at rest position, the apparatus described is brought into use by the technician for recording or capturing this normal relationship between the jaws and ridges for future use in my method of making dentures.

With the trays disposed within the mouth as described, and the jaws of the patient being relaxed, the male and female ends of the relater and connecting rods are brought into meshing position and the rods are locked together.

Thus a rigid lock is provided between the separable elements which is an important and essential feature of my invention. The operator having locked the relater rod of the upper tray to the upper connecting rod and the relater rod of the lower tray to the lower connecting rod then adjusts the units vertically on the vertical post to conform to the vertical position of the trays within the mouth, and when such vertical spacing is found and determined the universal joint or supporting units are locked against relative movement with respect to the vertical post by means of the set screws **9**. At this point I desire to point out that the relater rod of the lower tray is angularly formed as shown in order to space the supporting units a substantial distance apart along the post to provide for facile adjustment and manipulation thereof.

With the parts relatively positioned and locked as described it is essential to provide means for capturing and recording the relative lateral and longitudinal tilting of the trays caused by such angular disposition or relative relationship of the mandibular and maxillary ridges. Such lateral and longitudinal tilting of the trays is transmitted to the rigidly connected relater and connecting rods, which due to the universal joint connection with the units **3** and **5** may have a rotary or swivel action. Thus lateral tilting of the trays induces a rotary movement in the relater and connecting rods with a corresponding movement of the spherical member, while a longitudinal tilting of the trays induces swiveling or oscillatory action on the relater and connecting rods with a corresponding movement of the spherical member. When the relater and connecting rods and the spherical member have reacted as described, the plungers **17** are moved inwardly of the socket into locking engagement with the spherical members thereby locking the relater and connecting rods into the positions induced by the angular disposition of the trays, and the relation of the mandibular and maxillary ridges is thereby contained in the position in which the spherical members are locked.

The relater has now been adjusted and locked in position to capture and record the exact relative positions of the trays within the mouth of the patient. As the trays can only be removed from the mouth one at a time it is necessary to detach them from the connecting rods which is done by removing the screws **61**. Such removal of the trays from the apparatus by detachment of the relater rods from the connecting rods does not result in losing the mandibular maxillary relationship for such relationship is contained in the setting and positioning of the various elements of the apparatus.

When the operator has removed the trays from the patient's mouth plaster casts are poured into the trays and then the trays with the casts therein are remounted on the relater apparatus. As the relative position of the trays is contained in the setting of the relater the trays when remounted thereon will automatically assume such position, which will represent the true normal relationship of the mandibular and maxillary ridges when the patient is at rest. The case is now ready to be mounted on the usual articulator which is done while the case (that is the trays with the casts therein) is mounted on the relater apparatus. Thus the proper positioning of the case is transferred from the case on the relater to the case on the articulator. After being mounted and secured on the articulator the usual method of setting up the teeth is followed.

From my description of this method and apparatus it will be clear that the vertical spacing of the mandibular and maxillary ridges is recorded in the vertical spacing of the units **3** and **5** on the vertical post **1**, and that the lat-

eral and longitudinal tilting of the ridges is recorded in the position at which the spherical members **23** and the connecting rods **27** are locked, the lateral tilting transmitting a rotary movement to the connector rods, and the longitudinal tilting transmitting a swivel movement to such rods. Hence, the trays may be removed from the mouth and the apparatus after the latter has been set to record the tray positions when in the mouth, and then the trays may be again attached thereto and the trays will assume their former positions. By the construction of the mating portions of the relater and connecting rods it will be clear that no relative rotary or radial movement is possible and therefore the point and position of attachment will be exactly the same as the point and position of detachment.

I claim:

1. An apparatus of the class described, comprising a post, a pair of supporting units having collars thereon slidably receiving the post, and means for clamping said collars to the post, said supporting units forming sockets, a spherical member mounted in each socket for swivel movement therein, a connecting rod rigidly attached to and projecting from each spherical member in the same general direction, means for locking the spherical members in adjusted position within the supporting units, and a pair of trays having eyes integrally formed thereon, relater rods mounted in and removably secured in said eyes to project from the trays one of said rods having an offset portion, the connecting and relator rods having complementary meshing end portions for locking engagement to attach the trays and relater rods to the connecting rods and units.

2. An apparatus of the class described, comprising a post and a pair of supporting units adjustably mounted thereon, means for locking said supporting units in adjusted position on the post, connecting rods carried by and projecting from said units in the same general direction for universal movement relative thereto to assume different angular positions relative to said post, and means for locking each connecting rod in an adjusted position, a pair of trays formed from impressions of the mandibular and maxillary ridges having relater rods rigidly attached to and projecting therefrom for detachable connection with said connecting rods, each tray carried means when in attachment with a connecting rod being always disposed in the same angular position relative to the post as that of the connecting rod to which it is attached, whereby the trays may be detached and again attached to the apparatus in the same relative position.

3. An apparatus of the class described, comprising a post and a pair of supprting units adjustably mounted thereon, connecting rods carried by and projecting from said units in the same general direction for universal movement relative thereto, a pair of trays formed from impressions of the mandibular and maxillary ridges having relater rods rigidly attached thereto and projecting therefrom for removable attachment to the ends of said connecting rods, mating engaging end portions on said relater and connecting rods having meshing surfaces thereon, and locking means to lock said relater and connecting rod end portions together solely in axial alinement against relative movement, the relative positions of the connecting rods and supporting units when said connecting rods are attached to the relater rods being induced by and dependent upon the position of the trays, and separate means for locking said connecting rods and supporting units in such induced positions against change when the trays and relater rods are detached from and again attached to said connecting rods.

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