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DENTAL ARTICULATOR

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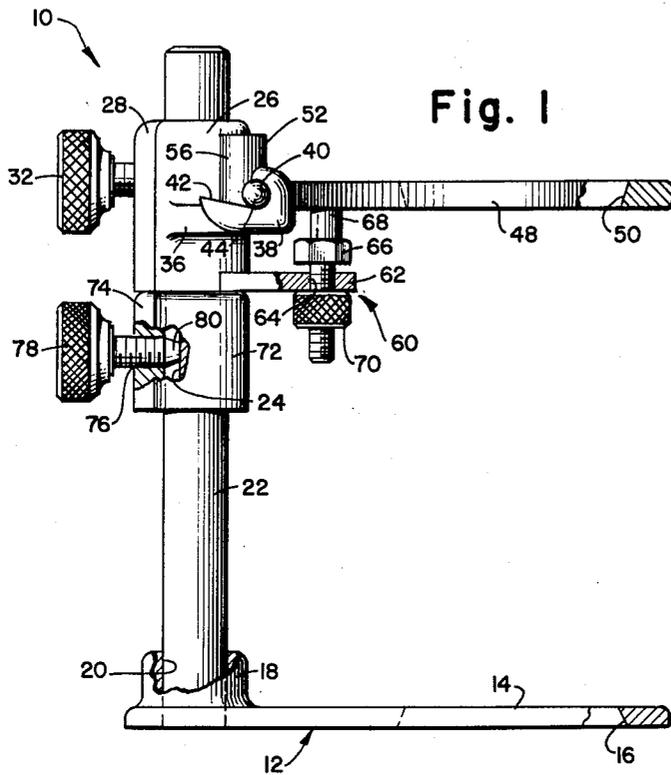


Fig. 1

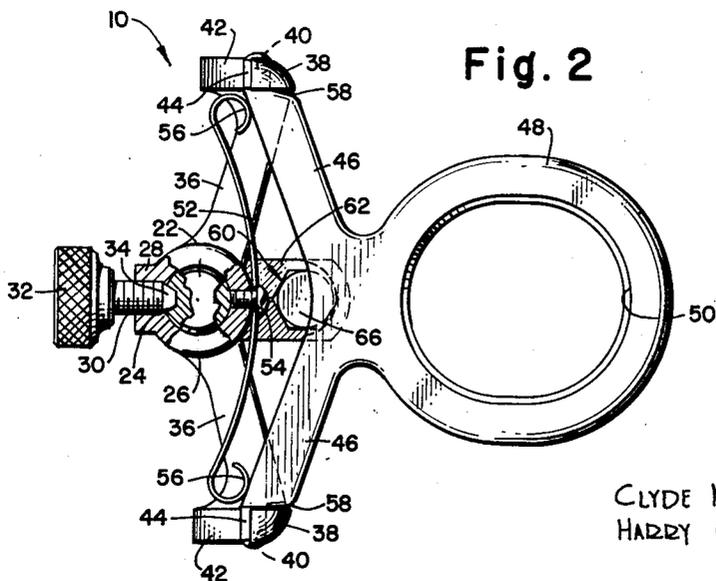


Fig. 2

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**DENTAL ARTICULATOR**

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This invention relates to artificial dentures and more particularly to an improved articulator for use in making artificial dentures and a method of making duplicate, interchangeable artificial dentures utilizing a pair of such articulators.

In the conventional method of making artificial dentures, a set of impressions is first made of the patient's gums. From this impression, upper and lower models, usually in the form of plaster of Paris casts, are made. The upper and lower models are then secured in an articulator which serves to mount the models in spaced relation with respect to each other corresponding to the proper spaced relation of the patient's gums. Usually, a wax bite is taken from the patient to obtain a proper spacing of the models when they are secured in the articulator. The wax bite is sandwiched between the upper and lower models so as to properly space the same and in this condition the models are sealed or otherwise secured to the model receiving plates of the articulator.

After the models have been properly secured to the plates of the articulator a temporary wax-like material is applied to the models and individual teeth are then set into the temporary material. During the setting operation the plate of the articulator carrying the upper model is pivoted or otherwise moved relative to the lower model in an action simulating the action of the jaws, thus insuring to a considerable degree that the teeth set in the material will have proper occlusion.

Usually, after the teeth have been initially set they are removed from the models along with the temporary material and then fitted in the patient's mouth to determine if any slight adjustments need to be made. These "try-ins" are then placed back on the models and any adjustments which are necessary are made. The artificial dentures themselves are made by forming a cast around the teeth in cooperation with the models. The temporary material is then melted and removed from the cast forming a cavity within which the material forming the gum portion of the artificial dentures is molded.

An object of the present invention is the provision of an articulator which is simple in construction and yet provides an accurate articulated movement of the upper model receiving plate relative to the lower model receiving plate which closely simulates the movement of the jaw.

Another object of the present invention is the provision of an articulator of the type described which has but relatively few parts which are simple to operate and which are economical to manufacture and assemble.

Still another object of the present invention is the provision of an articulator of the type described having a removable upper model receiving plate and means for insuring that the upper model receiving plate can be replaced in exact relation with respect to the lower model receiving plate once it has been removed.

With prior practices, if a patient desires to have an extra set of artificial dentures made so that they will be available in the event that either the upper or lower plate of the set he is using becomes damaged or otherwise unusable, the procedure outlined above is simply repeated. One reason that the practice of obtaining a duplicate set of dentures is not more widespread is because the dentures thus made seldom have an identical fit. It will be understood that any set of artificial dentures must be "broken

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in" before they become comfortable to the user. That is, there is usually a period of some weeks during which the dentures cause discomfort but after the passage of time they become suited to the gums of the user. Only slight differences can cause this discomfort so that usually one set of a duplicate set of dentures cannot be used by the patient without the discomfort mentioned above.

It has been found that one of the reasons for the difficulty in fit is a result of taking two separate impressions of the patient's gums. It is virtually impossible to obtain two identical impressions, due to changes in temperature and slight relative movements with respect to the upper and lower jaws of the patient. Of course, where the original impressions vary even slightly, the fit of the dentures made from the impressions will also vary. Even though this variance is slight the two sets of dentures cannot be selectively used by the patient without one of the sets causing discomfort.

Another reason that the use of duplicate sets of artificial dentures has not become widespread is that the plates of each set usually are not made so that each plate of one set will have proper occlusion with the opposite plate of the other set. Thus, the plates of the duplicate sets of artificial dentures made in accordance with prior practices are usually not truly duplicates nor interchangeable, both from the standpoint of fit and occlusion.

The present invention also provides a novel method of making duplicate interchangeable artificial dentures in which two sets of models are made from a single set of impressions of the patient's gums, one set of models being utilized to form the "try-ins," the try-ins then being utilized to properly interrelate the first lower model with the second upper model and the first upper model with the second lower model, the models so related then being utilized to set up a second set of teeth, the teeth of the second upper model having proper occlusion with the teeth of the first lower model and the teeth of the second lower model having proper occlusion with the teeth of the first upper model.

Still another object of the present invention is the provision of a method of the type described utilizing a pair of articulators of the type described which permits convenient interchangeability of either upper model with respect to either lower model so as to insure that the teeth of the second upper and lower models will be set with proper occlusion with respect to the teeth of both the first and second opposite models.

These and other objects of the present invention will become more apparent during the course of the following detailed description and appended claims.

The invention may best be understood with reference to the accompanying drawings wherein an illustrative embodiment is shown.

In the drawings:

FIGURE 1 is a side elevational view, with parts broken away, of an articulator embodying the principles of the present invention; and

FIGURE 2 is a top plan view of the articulator.

Referring now more particularly to the drawings, there is shown in FIGURES 1 and 2 an articulator, generally indicated at 10, which embodies the principles of the present invention. The articulator includes a base 12 having a lower model receiving plate portion 14, which is preferably of elliptical configuration, provided with a central opening 16 having an upwardly and inwardly inclined wall. The base 12 also includes a collar portion 18 which is apertured, as at 20, to receive the lower end of a vertical post or shaft 22. The shaft is fixed within the collar portion 18 by any suitable arrangement such as soldering, sweat fit, a cross-pin, a set screw or a forced fit.

As best shown in FIGURE 2, a groove 24 is formed

in the exterior surface of the shaft 22 and extends throughout the length thereof. Preferably, the groove 24 is wedge-shaped in cross-section as illustrated in FIGURE 2.

Slidably mounted on the shaft 22 above the base 12 is an upper collar 26. Any suitable means may be provided for securing the collar 26 to the shaft 22 in different positions of vertical adjustment. As shown, the collar includes a boss 28 which is apertured, as at 30, to receive a set screw or thumb screw 32, the inner end of which is frusto-conical, as indicated at 34, to engage within the tapered groove 24. This arrangement is preferred, since it serves to maintain the collar 26 in a constant angular position with respect to the shaft 22.

Extending outwardly from the collar 26 is a pair of opposed arms 36, the extremities of which have generally hook-shaped lugs 38 formed thereon. As best shown in FIGURE 1, each of the hook-shaped lugs defines a pivot surface 40 which is preferably semi-cylindrical and is open horizontally. Each hook-shaped lug also defines an upwardly facing sliding surface 42 which is preferably inclined at an acute angle with respect to the horizontal.

The pivot surface 40 of the lugs 38 are arranged to receive pins 44 formed on the extremities of a pair of arms 46 extending outwardly from an upper model receiving plate 48. As before, the plate 48 is preferably elliptical in configuration and is provided with a central opening 50, the wall of which is inclined inwardly and downwardly. The pins 44 are resiliently urged into engagement with the pivot surfaces 40 by suitable spring means which, as shown, is preferably in the form of a leaf spring 52. The central portion of the leaf spring 52 is apertured to receive a fastening element 54, such as a bolt or the like, arranged to threadedly engage within the collar 26. The outer ends of the leaf spring 52 are bent into generally circular loop formation, as indicated at 56, each loop engaging the outer end of the associated arm 36.

It can be seen that the upper model receiving plate 48 is pivotally maintained by the engagement of the pins 44 within the pivot surfaces 40 for movement with respect to the lower model receiving plate about a transverse horizontal axis. The position of the axis is such that it approximates the pivotal axis of the jaw of the patient. It will also be noted that either or both of the pins 44 may be moved out of the pivot surface 40 against the action of the leaf spring so that it rides on the associated sliding surface 42. To permit this movement the end of each arm adjacent the inner end of the pin is provided with an arcuate surface 58 which engages the associated lug during such sliding movement. Thus, the upper model receiving plate is capable not only of simulating the normal pivotal movement of the patient's jaw, but the sidewise movement of the jaw as well. These combined actions insure proper occlusion of the teeth during the setting operation.

In order to limit the downward pivotal movement of the upper model receiving plate, there is provided between the latter and the collar 26 a stop means, generally indicated at 60, which is preferably adjustable so as to limit this downward pivotal movement at a selected one of a plurality of different positions. The stop means may be of any suitable construction and, as shown, includes a lug 62 rigidly secured on the lower end of the collar 26 having a central opening 64 threadedly receiving a stop bolt 66. The head of the bolt is preferably disposed above the lug 64 and is arranged to be engaged by a depending abutment 68 formed on the upper model receiving plate 48 in a position between the arms 46. The stop bolt 66 may be secured in different positions of vertical adjustment by means of a locking nut 70 threaded on the bolt and engaged against the lower surface of the lug 64.

In using the articulator 10 for making a single set of artificial dentures, the upper and lower models having a wax bite interposed therebetween are placed on the lower model receiving plate and the collar 26 is then

lowered until the upper model receiving plate is disposed in proper relation to the upper model. The collar 26 is then fixed to the shaft 22 by engaging the end 34 of the thumb screw 32 within the groove 24. Of course, stop means 60 is also adjusted in relation to the position of the collar to correspond to the models.

With the collar set in vertical position above the base 12, the upper and lower models are then sealed to the upper and lower model receiving plates respectively. This sealing operation is preferably accomplished by the use of plaster of Paris or the like. When the models are sealed in place, the upper model receiving plate can be pivoted upwardly permitting the wax bite to be removed. The temporary tooth receiving material is then mounted on the models in the usual way and the teeth can then be set in the material. In setting the teeth the upper model receiving plate is articulated to simulate the action of the patient's jaw by pivoting the same with the pins 44 in contact with the pivot surfaces 40 and by sliding the pins along the surfaces 42. These actions insure that during the setting of the teeth there will be proper occlusion when the artificial dentures are ultimately formed.

In making duplicate, interchangeable sets of artificial dentures in accordance with the present method, two articulators are used, preferably of the construction indicated above. In carrying out the method of the present invention a set of impressions is first made of the patient's gums. From this set of impressions duplicate sets of upper and lower models are made.

It will be noted that under normal circumstances in making a model from an impression, the impression is usually destroyed in order to remove the model therefrom. Thus, in the prior art method of making duplicate interchangeable sets of artificial dentures two separate sets of impressions are taken from the patient's mouth. As indicated above, such impressions will never be identical. In accordance with the present method, in order to obtain identical impressions, master upper and lower models are made from a single set of impressions of the patient's gums. These master models are preferably made of a plaster-like material known in the art as "stone." From the master models a master impression is made, preferably of a resilient rubber-like material as, for example, Lang's elastic impression powder, manufactured by Lang Dental Manufacturing Co., Inc., of Chicago, Illinois. By utilizing a resilient material it is possible to remove the models from the impressions without destroying the same, and therefore any number of models can then be made from the master impressions and these models will be identical.

In carrying out the present method to make duplicate sets of dentures, duplicate sets of upper and lower models are made from the master impression. Preferably, these models should be made within a short period after the master impression has been formed. For example, in using Lang's elastic impression powder, it is recommended that the models be poured immediately so that in obtaining duplicate sets of models from such master impressions both sets should be poured as soon as possible. Of course, other resilient impression materials may be utilized and in such case it may be possible that a permanent master impression could be obtained which would not require immediate formation of the models.

The master models are not utilized in the present process other than to make the master impressions, since they are made from the original impressions rather than from the master impressions and therefore there is a chance that they may not be exactly identical with the models made from the master impressions. Of course, where both of the duplicate sets of upper and lower models are made from the master impressions they will be identical. It is important in the present invention that the models be identical since, as noted above, slight differences would result in one of the sets causing the patient discomfort.

The first set of models is placed in a first articulator in

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the manner indicated above and after the teeth are initially set, utilizing the pivotal and sliding movement of the articulator, the upper and lower teeth mounted on the temporary material are removed and fitted in the mouth of the patient to determine if any final adjustments need to be made. These "try-ins" are then replaced on the upper and lower models on the first articulator and any adjustments necessary are made.

When utilizing a pair of articulators in accordance with the present invention, a lower collar 72 is slidably mounted on the shaft 22 between the base 12 and the upper collar 26. Again, any suitable means may be provided for locking the lower collar 72 on the shaft and, as shown, this means embodies a boss 74 having a threaded aperture 76 formed therein for receiving a set screw or thumb screw 78. The inner end of the thumb screw is frusto-conical, as indicated at 80, for engaging within the tapered groove 24.

After the try-ins have been placed back on the first articulator, the lower collar 72 is positioned in abutting engagement with the upper collar, thus insuring that when the upper collar is removed from the shaft 22 it can be replaced on the shaft in exactly the same vertical position that it previously assumed. With the lower collar 72 in engagement with the upper collar, the latter together with the upper model receiving plate and first upper model carried thereby, is removed and the upper collar together with the upper model receiving plate of the second articulator is placed on the shaft 22 of the first articulator in engagement with the lower collar 72 thereof. The second upper model is then sealed to the second upper model receiving plate 48 utilizing the try-ins to properly position the second upper model in relation to the first lower model.

The first upper collar together with the first model carried thereby is then mounted on the shaft 22 of the second articulator and is properly positioned thereon with the second lower model and the try-ins interposed therebetween. In this condition, the second lower model is then sealed to the lower model receiving plate of the second articulator and the collar 72 of the second articulator is locked into a position of abutment with the first collar 26 mounted on the shaft thereof. In this way, the first lower model and the second upper model are properly mounted on the first articulator and the second lower model and first upper model are properly mounted in identical fashion on the second articulator.

In this condition, the temporary tooth receiving material is applied to the second model on the first articulator and individual teeth are set therein in relation to the lower teeth of the try-ins and temporary material is likewise applied to the second lower model on the second articulator and individual teeth are set therein in relation to the upper teeth of the try-ins. It will be noted that the lower collars secured to the shafts of each of the first and second articulators permit the first and second upper collars together with the models carried thereby to be interchangeably placed on either of the articulators.

Preferably, during the setting operation of the teeth of the second upper and lower models the upper collars are interchanged as indicated above, so as to insure that the teeth as set have proper occlusion not only in relation to the opposite teeth of the try-ins, but to the opposite teeth being set. It will be understood that after the teeth have

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been properly set so that interchangeable occlusion is insured, the temporary tooth mounting material of both sets of dentures is replaced by permanent material in the usual way.

It thus will be seen that the objects of this invention have been fully and effectively accomplished. It will be realized, however, that the foregoing specific embodiment has been shown and described only for the purpose of illustrating the principles of this invention and is subject to extensive change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

We claim:

1. An articulator comprising a base having a generally horizontally extending lower model receiving plate portion and a shaft receiving collar portion fixed with respect thereto, a vertical shaft fixed to the collar portion of said base and extending upwardly therefrom, a collar mounted on said shaft above said base for vertical sliding movement, means carried by said collar for fixing the latter in different positions of vertical adjustment on said shaft; said collar having a pair of opposed rigid supporting arms extending outwardly therefrom, generally hook-shaped lugs formed on the outer ends of said supporting arms defining aligned horizontally opening pivot surfaces and upwardly facing sliding surfaces, an upper model receiving plate having a pair of opposed rigid attaching arms extending outwardly therefrom, aligned pins formed on the outer ends of said attaching arms for engaging the pivot and sliding surfaces of said lugs, a leaf spring having a central portion secured to said collar and opposed ends engaging said attaching arms for resiliently biasing said pins into said horizontally opening pivot surfaces whereby said upper model receiving plate can pivot about the axis of said pins relative to said lower model receiving plate portion, a rigid stop lug extending outwardly from said collar below and between said supporting arms, an adjustable stop member threadedly mounted in said stop lug having its upper end positioned to engage said upper model receiving plate for adjustably limiting the downward pivotal movement of the latter with respect to said lower model receiving plate portion, a second collar on said shaft, and means carried by said second collar for fixing the latter in different positions of vertical adjustment on said shaft below and in abutting engagement with said first mentioned collar.

2. An articulator as defined in claim 1 wherein said shaft is provided in a longitudinally extending groove which tapers outwardly in cross-section, and wherein said collar adjusting means comprises a set screw threaded in said collar and having a frusto-conical end arranged to engage within said groove.

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