Nov. 17, 1936. L. N. ROEBUCK 2,061,484

APPARATUS FOR USE IN THE FORMATION OF ARTIFICIAL DENTURES

Filed Oct. 11, 1933

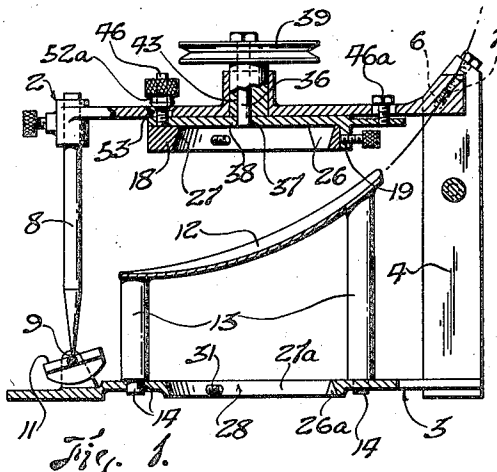


Fig. 1.

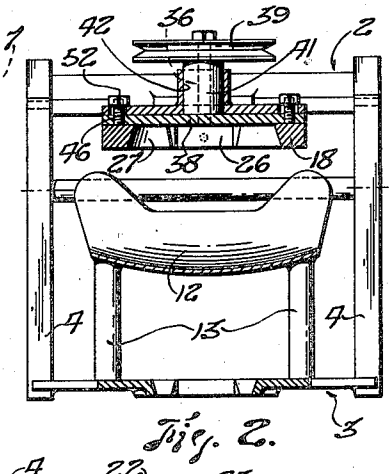


Fig. 2.

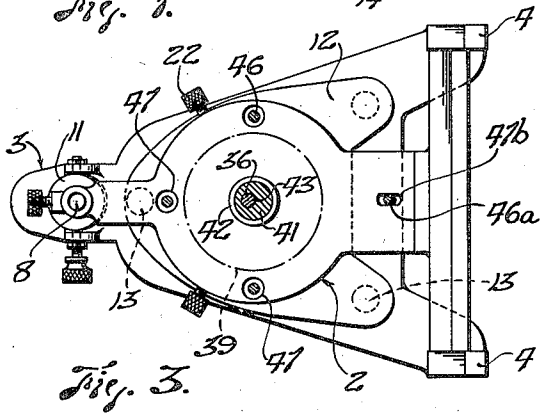


Fig. 3.

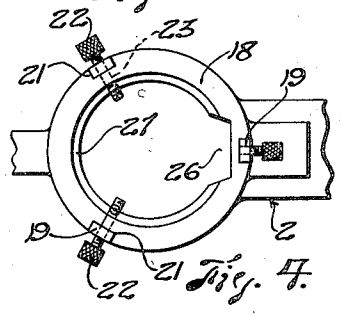


Fig. 4.

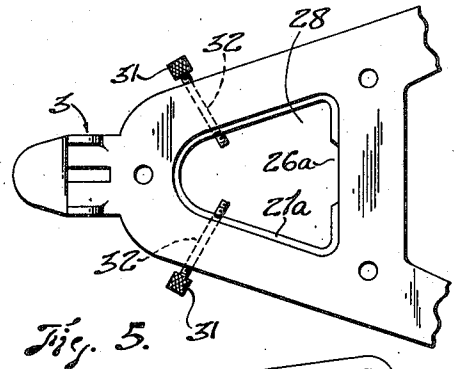


Fig. 5.

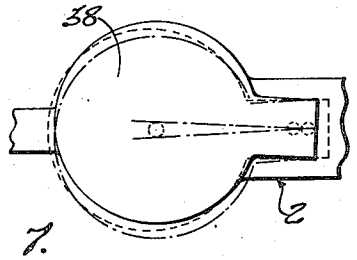


Fig. 7.

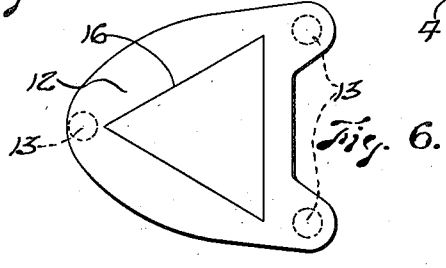


Fig. 6.

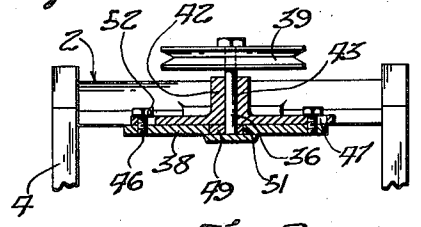


Fig. 8.

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APPARATUS FOR USE IN THE FORMATION OF ARTIFICIAL DENTURES

Leslie Norman Roebuck, Melbourne, Victoria, Australia

Application October 11, 1933, Serial No. 693,203
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9 Claims. (Cl. 32—32)

This invention relates to the formation of artificial dentures and refers more particularly to apparatus of the kind which is known in the dental art as an articulator and comprises upper and lower frame members upon which the upper and lower artificial dentures are assembled, said upper frame member being hingeably connected to the lower frame member in such a manner as to permit of rearward, lateral and intermediate relative movements between the said frame members and the dentures supported thereon.

Hitherto articulators of the kind referred to have not proved to be entirely satisfactory due, inter alia, to the fact that they did not include effective means for positively assembling the cooperating teeth of upper and lower dentures in the correct occlusion. Furthermore, known types of articulators are of relatively complex and expensive construction and do not embody efficient means whereby partly finished dentures which have been removed from the articulator may be subsequently replaced thereon in accurate, occlusal alignment. It is well known in the dental art that unless dentures are fitted to the patient so as to remain in operative engagement in central, forward and lateral occlusion, considerable inconvenience is experienced by the wearer, whilst the teeth are easily displaced if they are brought together other than in central occlusion.

The primary object of the present invention is to provide improved apparatus for the purpose indicated which simplifies the operation of setting up the teeth in correct occlusal alignment.

One of the objects of the present invention is to provide in an articulator of the kind indicated a non-adjustable template for setting up the teeth of full sets of artificial dentures, the upper surface of said template being of concave curvature corresponding to a predetermined sized sphere, said template being adapted for mounting on the articulator in such a manner that it meets the requirements of the average human jaw.

Another object of the invention is to provide in an articulator of the kind indicated simple and inexpensive rotary grinding means whereby the teeth on the assembled dentures may be ground together in such a manner that the possibility of the teeth locking together when in use is reduced to a minimum.

A further object of the invention is to provide in an articulator of the kind indicated simple and efficient mounting means whereby either the upper or lower dentures may be removed from the articulator if found necessary and subsequently replaced in correct alignment when so desired.

The above and various other objects and features of the invention will be more readily apparent from the following description which refers by way of example to one suitable embodiment of the invention.

Referring to the drawing which forms part of this specification—

Figure 1 is a longitudinal section of a dental articulator or the like in accordance with the present invention.

Figure 2 is a transverse section of the parts seen in Figure 1.

Figure 3 is a plan view of Figure 1.

Figure 4 is an inverted fragmentary plan view showing detachable mounting means for the upper denture.

Figure 5 is a fragmentary plan view showing mounting means for the lower denture.

Figure 6 is a plan view of a non-adjustable template for assembling the teeth of the upper denture.

Figure 7 is a fragmentary inverted plan view showing the approximate positions assumed by an oscillating plate carrying the upper denture during a rotary grinding operation.

Figure 8 is a sectional detail showing rotary grinding means in accordance with a modification of the invention.

The improved articulator includes upper and lower frame members 2 and 3 respectively, the latter serving as a base or support whilst the former is hingeably connected to the lower frame member as hereinafter described. Both frame members 2, 3 may be of substantially triangular shape in plan whilst the lower frame member is provided at its rear end with a plurality of upstanding supporting arms 4. Th upper frame member 2 is hingeably connected at its rear end as at 6 to the upper ends of these supporting arms so that said upper frame member may be moved rearwardly and laterally and swung upwardly in relation to the lower frame member.

The aforesaid hingeable connection is preferably spring influenced as indicated at 7, and located on the curved path of the occlusal plane as hereinafter described. A depending leg or supporting post 8 is carried at the front end of the upper frame member, the lower end of this post being pointed as at 9 and adapted to rest upon an adjustable bearing surface 11 on the lower frame member.

In combination with the foregoing the invention includes a curved non-adjustable supporting

member or template 12 for assembling the teeth on the upper denture in the correct occlusal alignment.

It has been ascertained heretofore that when the human jaws are closed the meeting edges of the teeth are located on a curved line which extends between the junction of the front incisor teeth to the hinged joint known as the temporo-mandibular joint between the upper and lower jaws. This curved line forms part of a sphere which is known in the art as the "curve of Spee" and it is highly important in setting up artificial dentures that the lower edges of the upper teeth, for example, should lie on this line.

Naturally the diameter of this curve may vary with individual cases but I have ascertained, after considerable research and experiment, that satisfactory results are obtainable by using the same average curve in each case. One suitable curve is approximately of nine and one-half inches diameter and has been found to provide a curve on the occlusal plane which is not too severe, the jaw muscles serving to compensate for any slight differences in size in individual cases. It is to be understood, however, that the invention is not limited to this sized curve but that the latter may be varied according to circumstances.

The upper surface of the template 12 is curved both longitudinally and laterally to the shape indicated in the preceding paragraph and the template may be provided with a plurality of supporting legs 13 whereby it may be mounted upon the lower frame member 3 and accurately positioned, for example, by pin and socket connections 14 between the lower ends of said legs and the associated frame member. When in position the curved surface of the template coincides with an arc passing through the aforesaid hingeable connection 6 of the articulator as indicated in Figure 1 of the drawing, so that the arrangement closely follows the structure of the human jaw as aforesaid.

I have also ascertained that the human teeth, when viewed in plan, are arranged in such a manner that straight lines drawn between the base of the two rear molars and the point between the cutting edge of the two incisor teeth gives a triangle. This triangle is equilateral and substantially one-quarter of the size of the "Bonwill triangle" which is known in the art and has its base located between the two condyles and its apex between the two central incisor teeth at their cutting edge. The size of this smaller triangle may be determined by dividing the opposite sides of the "Bonwill triangle" and joining these two points by a straight line which is thus parallel to the base. The aforesaid smaller triangle is marked as at 16 upon the upper surface of the non-adjustable template 12 to serve as a guide for positioning the teeth.

Detachable mounting means for the usual plaster models is provided on both the upper and lower frame members 2, 3 whereby a partly finished denture may be removed from the articulator as before mentioned. As seen in Figures 1, 2, and 4 of the drawing the mounting means on the upper frame member may comprise a denture supporting ring member 18 adapted to detachably engage a plurality of depending tongues or lugs 19 carried by the upper frame member, said ring member being provided with a plurality of circumferentially spaced slots 21 to accommodate said lugs. A radial screw 22 may be carried by each of the lugs 19, certain of said screws being adapted to screw into co-aligned holes 23 in the ring member and also into the plaster or like models which are carried thereby.

A section of the inner circumferential surface of the ring member 18 is preferably cut away and inclined upwardly and outwardly as at 26 whilst the remaining surface 27 is inclined upwardly and inwardly so that when plaster or the like is poured into the ring it spreads into the aforesaid outwardly inclined section 26 and forms a wedge portion on said model which assists in holding the model in position.

The mounting means on the lower frame member 3 may consist of an aperture 28 formed through the frame member, a section of the surrounding surface of the latter being cut away and inclined upwardly and inwardly as at 26*a* whilst the remaining surface 27*a* is inclined upwardly and outwardly, so that a wedge-like portion as aforesaid may be formed upon the lower plaster model. A plurality of screws 31 are also accommodated in holes 32 in the lower frame member as seen in Figure 5 of the drawing, said screws being screwed into the plaster model to assist in holding it in position.

Associated with the foregoing is rotary grinding means for moving portion of the upper frame member 2 carrying the upper denture in relation to the denture on the lower frame member. Said grinding means includes a vertical spindle 36 which may be fixed at its lower end as at 37 to an oscillating plate member 38. A pulley 39 may be mounted at the upper end of said spindle, this pulley being adapted for connection to a power driven belt and provided with a depending sleeve 41 fitting within a hole or bearing 42 in the upper frame member 2. The spindle 36 passes freely through a hole 43 extending through said sleeve and the pulley, and this latter hole is located off the centre of the sleeve and pulley so that the latter, when rotating, co-operates with the spindle 36 and the bearing 42 to impart an eccentric movement to the oscillating plate member as hereinafter described. As seen more clearly in Figure 4 of the drawing the oscillating plate carries the aforesaid series of depending lugs or tongues 19 which accommodate the detachable ring member 18.

Means are provided for preventing rotation of the oscillating plate 38 in relation to its associated frame member 2 and such means may consist of a plurality of guide pins 46 passing freely through guide holes 47 in the frame member and secured at their lower ends to the oscillating plate. Four of such guide pins 46 may be employed as seen in Figure 3 of the drawing, in which case the guide holes near the front and sides of the frame member may be circular and of sufficient diameter to permit of relative movement between the two members 2 and 38 in a substantially circular path. A rear guide pin 46*a* passes through and bears against the sides of an elongated guide slot 47*b* in the upper frame member and it is believed that this slot causes the oscillating plate 38 to swing in lateral and inclined forward and rearward directions as indicated in Figure 7 of the drawing, in addition to the substantially circular movement beforementioned so that during the grinding operations a greater degree of movement is imparted to the incisor teeth of the denture than the movement to which the molars are subjected, thus closely following the movements of the human jaw.

According to a modification as illustrated in Figure 8 of the drawing, the aforesaid pulley 39

may be secured to the upper end of the spindle 36. In this instance said spindle passes freely through the hole or bearing 42 in the upper frame member and is provided at its lower end with an eccentric sheave or the like 49 fitted within a hole 51 in the oscillating plate member 38. In either embodiment rotation of the pulley 39 results in the oscillating plate 38 carrying the denture supporting ring 18 being moved bodily in a substantially circular path in relation to its associated upper frame member, whilst the aforesaid rear guide pin 46a and its associated guide slot 47b function to cause the denture supporting plate to reciprocate laterally, forwardly and rearwardly together with the intermediate movements therebetween.

The aforesaid guide pins 46 are provided at their upper ends with enlarged heads 52 and one of these heads 52a may have an inclined annular face 53 adapted to fit within its associated guide hole which is preferably countersunk as seen in Figure 1 of the drawing so that the denture supporting ring 18 and the upper frame member 2 may be secured in the central occlusion position by simply screwing up the head 52a into engagement with its countersunk guide hole.

The improved apparatus is capable of being employed in carrying out several known methods of orienting and grinding artificial dentures and by way of example one suitable method is hereinafter described. The occlusal plane of upper and lower "bite blocks" is trimmed down until it is parallel with a line drawn on the patient's face from the external auditory meaters to the wing of the nose and after registering central occlusion in the patient's mouth the upper "bite block" together with its plaster model is placed upon the triangle 16 on the non-adjustable template 12 and temporarily held in position by sticky wax or the like. Whilst in this position the model is secured to the denture supporting ring 18 on the upper frame member by plaster or the like. The template is then removed and the lower "bite block" and its model mounted upon the lower frame member 3, the relative positions of the two bite blocks agreeing with the position which was previously registered in the patient's mouth. After the lower model has been plastered to the lower frame member, as aforesaid, the two bite blocks are removed from their models and replaced by temporary denture plates composed of wax or the like. The template 12 is again placed in position and the upper teeth fixed to the respective wax plate, the template serving as a guide for correctly positioning the teeth. The lower teeth may be then fixed to their wax plate and readily set to the teeth on the upper plate. A coating of carborundum powder and glycerine may be applied to the teeth and the latter ground together by the rotary grinder. The permanent denture plates may be then fixed to the teeth by vulcanizing in a "flask" or in any other suitable manner.

Various alterations, modifications and/or additions may be embodied in the foregoing without departing from the spirit and scope of the invention as defined by the appended claims.

Having now described my invention what I claim as new and desire to secure by Letters Patent is—

1. Apparatus for use in the formation of artificial dentures comprising in combination upper and lower frame members hingeably connected together at a point approximating the position of the temporomandibular joint in the human jaw, a template having a curved upper surface forming part of an imaginary spherical surface of predetermined diameter and mounting means for supporting said template upon the articulator in only one single predetermined operative position so that the curved upper surface of the template coincides with an arc passing through said hingeable connection whereby the same template in the same particular attitude may be employed for setting up artificial dentures for patients having jaws of average size and shape, in combination with detachable mounting means for securing an upper denture and its plaster or like model to the upper frame member, said mounting means comprising a detachable denture model holding ring, a section of the inner circumferential surface of which is cut away and inclined upwardly and outwardly whilst the remaining surface is inclined upwardly and inwardly so that when plaster or the like is poured into said ring it spreads into the aforesaid section and forms a wedge portion on the model said wedge portion and cut away section thus forming a dovetailed connection which assists in removably holding said model in position for the purpose specified.

2. Apparatus for use in the formation of artificial dentures comprising in combination upper and lower frame members hingeably connected together at a point approximating the position of the temporomandibular joint in the human jaw, a template having a curved upper surface forming part of an imaginary spherical surface of predetermined diameter and mounting means for supporting said template upon the articulator in only one single predetermined operative position so that the curved upper surface of the template coincides with an arc passing through said hingeable connection whereby the same template in the same particular attitude may be employed for setting up artificial dentures for patients having jaws of average size and shape, in combination with detachable mounting means for securing the upper denture and its plaster or like model to the upper frame member, said mounting means comprising a detachable denture model holding ring, a section of the inner circumferential surface of which is cut away and inclined upwardly and outwardly said upper frame member and the denture holding ring being provided with interfitting tongue and slot connections, and a plurality of screws adapted to hold the ring in position, each said screw passing through coaligned holes in one of said tongues and an adjacent part of the ring and extending inwardly or radially thereof so that said screws may be embedded in the plaster or like model for the purpose specified.

3. In apparatus for use in the formation of artificial dentures, the combination with upper and lower frame members hingeably connected together of mounting means for detachably securing the lower denture and its plaster or like model to the lower frame member, said mounting means comprising a lower frame member which is provided with an aperture, a section of the frame member surrounding said aperture being cut away and inclined upwardly and inwardly whilst the remaining surface is inclined upwardly and outwardly so that when plaster or the like is poured into the aperture it spreads into the aforesaid section and forms a wedge portion on the said model said wedge portion and cut away section thus forming a dove-tailed connection

which assists in holding said model in position for the purpose specified.

4. In apparatus for use in the formation of artificial dentures, the combination with upper and lower frame members hingeably connected together of mounting means for detachably securing the lower denture and its plaster or like model to the lower frame member, said mounting means comprising a lower frame member which is provided with an aperture, a section of the frame member surrounding said aperture being cut away and inclined upwardly and inwardly and the remaining surface being inclined upwardly and outwardly, and a plurality of screws accommodated in screwed holes in the lower frame member and capable of being extended into said aperture so that they may be embedded in the plaster or like model for the purpose specified.

5. In apparatus for use in the formation of artificial dentures, the combination with upper and lower frame members hingeably connected together of rotary grinding means for moving the portion of the upper frame member carrying the upper denture in relation to the denture on the lower frame member, said rotary grinding means comprising an oscillating plate member adapted to carry the upper denture, a plurality of guide pins for securing said oscillating plate to the upper frame member, certain of said pins being accommodated within substantially circular guide holes in the upper frame member whilst a guide pin which is located adjacent to the rear of the upper denture is accommodated within and adapted to bear against the sides of an elongated guide slot in said frame member, a single eccentric device being provided for effecting relative movement between said oscillating plate and the upper frame member substantially as and for the purpose specified.

6. In apparatus for use in the formation of artificial dentures, the combination with upper and lower frame members hingeably connected together, of rotary grinding means for moving the portion of the upper frame member carrying the upper denture in relation to the denture on the lower frame member, said rotary grinding means comprising an oscillating plate member adapted to carry the upper denture, a plurality of guide pins for securing said oscillating plate to the upper frame member, certain of said pins being accommodated within substantially circular guide holes in the upper frame member whilst a guide pin which is located adjacent to the rear of the upper denture is accommodated within and adapted to bear against the sides of an elongated guide slot in said frame member, a single eccentric device being provided for effecting relative movement between said oscillating plate and the upper frame member, said eccentric device including a spindle fixed at its lower end to said oscillating plate, a bearing on said upper frame member and a pulley rotatable in said bearing, said spindle passing freely through a hole in said pulley which hole is located off the pulley center for the purpose specified.

7. In apparatus for use in the formation of artificial dentures, the combination with upper and lower frame members hingeably connected together of rotary grinding means for moving portion of the upper frame member carrying the upper denture in relation to the denture on the lower frame member, said rotary grinding means comprising an oscillating plate member adapted to carry the upper denture, a plurality of guide pins for securing said oscillating plate to the upper frame member, certain of said pins being accommodated within substantially circular guide holes in the upper frame member whilst a guide pin which is located adjacent to the rear of the upper denture is accommodated within and adapted to bear against the sides of an elongated guide slot in said frame member, a single eccentric device being provided for effecting relative movement between said oscillating plate and the upper frame member, said eccentric device including a spindle mounted in a bearing on the upper frame member, a pulley fixed to said spindle, an eccentric sheave fixed adjacent to the lower end of said spindle and accommodated within a hole in said oscillating plate member for the purpose specified.

8. For use in a dental articulator or the like of the kind indicated, a denture holding ring adapted for detachable connection to an upper frame member of the articulator, a section of the inner circumferential surface of said ring being cut away and inclined upwardly and outwardly whilst the remaining part of said surface is inclined upwardly and inwardly substantially as and for the purpose specified.

9. For use in an articulator or the like of the kind indicated, an upper frame member carrying rotary grinding means which comprises an oscillating plate member, a plurality of guide pins for securing said oscillating plate to the frame member, said pins being accommodated within guide apertures in the upper frame member, certain of said apertures being of substantially circular shape whilst an aperture adjacent to the rear of said upper frame member is elongated longitudinally of the articulator, and a single eccentric device for effecting relative movement between said oscillating plate and the upper frame member the pin in said elongated aperture being of circular cross section and adapted to bear against the sides of the aperture and to move longitudinally thereof susbtantially as and for the purpose specified.

LESLIE NORMAN ROEBUCK.