April 1, 1941. E. J. FRANWICK 2,237,050

DENTAL ARTICULATOR

Filed Nov. 14, 1939

Fig. 1.

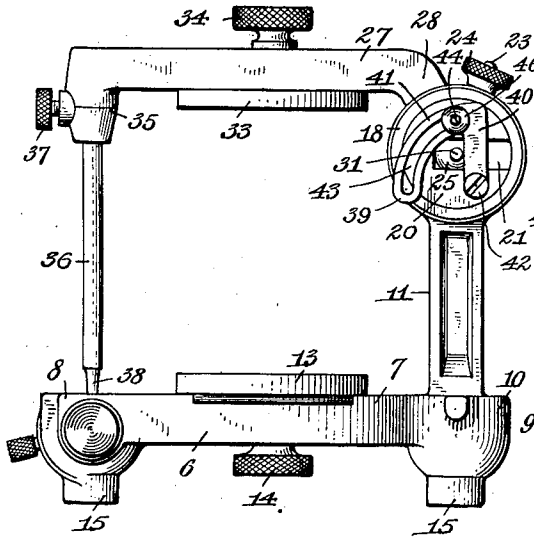


Fig. 2.

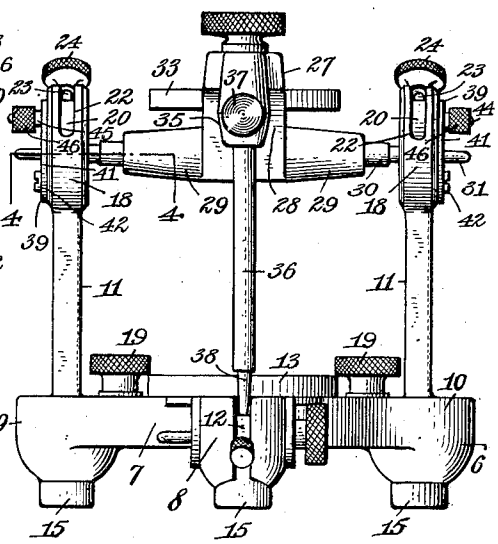


Fig. 3.

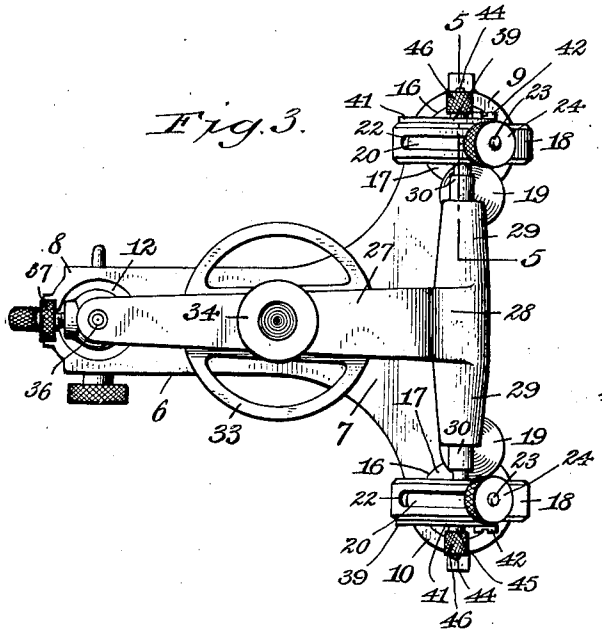


Fig. 4.

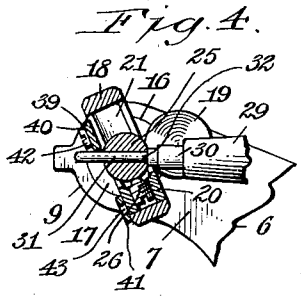
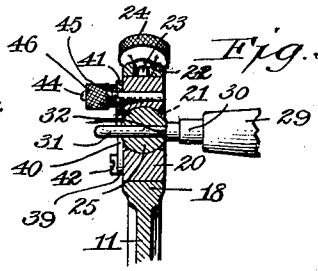


Fig. 5.



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UNITED STATES PATENT OFFICE

2,237,050

DENTAL ARTICULATOR

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Application November 14, 1939, Serial No. 304,357

3 Claims. (Cl. 32—32)

My invention relates to an improvement in dental articulators which, as will be clear to those skilled in the art, is for the purpose of supporting dentures or models on plates or bases for manipulation in the same or equivalent relation to that which they are to occupy when placed in the mouth of a patient.

In the process of mounting a set of models on an articulator of this kind, it is necessary that the lower model be mounted in what is known as centric relation to the upper model, or in other words in such relationship to each other as the jaws of a human being have when both condyle heads rest in their rearmost positions within the sockets of the fossae without strain. Very often a lower denture is unintentionally mounted with respect to the upper denture in protruded or lateral relation on the articulator. Such a mounting would not present the true relationship between instrument and anatomy so essential to the construction of satisfactory dentures. It must be understood that mounting records made in the mouth are made in centric relation. When mounting such records in the instrument, the jaw members of the instrument must be in centric relation. Articulators of the type in which this invention is embodied would permit lateral or protruded mounting of one of the models in the articulator; but this is guarded against by the use of this invention.

This invention is designed for use on the type of articulator patented by Rudolf L. Hanau May 8, 1928, No. 1,668,845, in which condylar elements are provided and arranged in triangular relation with respect to an incisal guide, and it is the object of this invention to overcome certain inaccuracies in the manipulation of the articulator when, through carelessness on the part of the operator, the co-relation of the parts desired is not maintained.

Another object of my invention is to provide a simple and efficient locking device for maintaining the upper jaw member of the articulator in centric relation to the lower jaw member, said locking device co-acting with projecting parts of said upper jaw member to retain centric relation between the two jaw members regardless of any adjustment made to the articulator.

With these and other objects in view to appear hereinafter, this invention consists in the novel features of construction and in the arrangement and combination of parts to be hereinafter described and more particularly pointed out in the subjoined claims.

In the drawing forming part of this application—

Fig. 1 is a side elevation of an articulator equipped with my invention in what I now consider preferred form.

Fig. 2 is a front elevation of the same.

Fig. 3 is a top plan view.

Fig. 4 is a cross section taken on line 4—4, Fig. 2, with the condylar head adjusted to a position different from that shown in Fig. 2.

Fig. 5 is a vertical section taken on line 5—5, Fig. 3.

In the particular articulator illustrated in the drawing, the numeral 6 designates the frame or support, which comprises a base 7 having three extremities 8, 9 and 10 in triangular relation, and from two of which rise transversely spaced uprights or posts 11 which may be referred to as condylar posts. In the third extremity is arranged an incisal guide device 12. The condylar posts are at the rear of the frame, while the incisal guide device is at the front of the frame. It will be clear, therefore, that the base, although not an exact triangle, approaches triangular formation in that it is wide at the rear end and gradually narrowed toward the front. The base has a mounting 13 secured to its upper face by means of a securing screw 14 passing through the base from the bottom and threaded into said mounting. This mounting is centered at the intersection of a plane passing centrally between the condylar posts and a plane passing transversely between and equidistant from the condylar posts and the incisal guide.

At the three corners of the triangular base 7, feet 15 are provided, and at the two rear angles of said base circular depressions 16 are formed. Each of the condylar posts 11 has a circumferential flange 17 at its lower end fitted into its cooperating depression 16 and a hollow circular condylar head 18 at its upper end. The condylar posts are rotatably adjustable within the circular depressions in the base, and for this purpose graduation marks may be provided on the base adjacent each of the circumferential flanges 17 and each of the flanges with an indicating mark for registration with any of the said graduation marks so as to determine the exact degree of rotation to which the condylar posts may be adjusted.

Threaded into the base 7 of the articulator and overlying the circumferential flanges of the condylar posts are securing screws 19 which serve to secure the condylar posts in any adjusted position.

Rotatably mounted in each condylar head 18 is a disk 20 having a slot 21 extending diametrically from one point of its edge inwardly beyond the axis of said disk, preferably in rectilinear manner. The opposite longitudinal walls of said slot are concaved, as clearly shown in Fig. 5. Each condylar head has a segmental slot 22 extending along a portion of its circular wall, preferably forwardly from the highest part of said head, and each disk has a screw stud 23 fastened therein which extends outwardly through the segmental slot of the head and has a clamping nut 24 threaded thereon and adapted to bear against the outer surface of the head to fasten the disk within the latter in any desired rotatively adjusted position. It will be apparent, therefore, that since said disks 20 are rotatively adjustable in the condylar heads 18 and the latter are rotatively adjustable in the base of the device, said disks are adjustable angularly as well as rotatively; the angular adjustment being effective by rotation of the condylar posts and the rotative adjustment being made within the condylar heads within the upper ends of said posts.

Arranged within the slots 21 of the rotatably adjustable disks are spherical or substantially spherical mountings or bearings 25 which are retained against lateral movement within said slots and therefore within said disks, by reason of their spherical surfaces fitting the concaved longitudinal walls of said slots. The slots 21 may be termed radial guide slots or guideways, and the spherical mountings or bearings 25, condylar spheres or balls. Said condylar spheres or elements 25 are movable lengthwise within said guideways and they are normally accurately centered by means of stops 26 in the form of adjustable screws threaded into the disks 20. This assures accurate centering of the condylar elements with respect to the axes on which the condylar posts 11 rotate. The condylar spheres or elements 25 are free to move lengthwise in the slots or guideways 21 of the rotatively adjustable disks 20, but by reason of their being confined within the concaved walls of said guideways are held against lateral movement.

27 designates the upper bracket or denture-holding member, which for convenience may be referred to as the upper jaw member, while the base 7 may be termed the lower jaw member. This upper jaw member, in the form shown, is comparatively narrow, and at its rear end has a downwardly-directed portion 28 slightly inclined rearwardly and provided at its lower end with opposite laterally-directed extensions 29 in which are secured pivot rods or shafts 30 which are reduced in diameter along their outer portions, as at 31, to form outwardly-facing shoulders 32. The outer reduced portions of said rods extend through the spherical condylar elements 25 and when the latter are in the position in which the dentures or models on the upper and lower jaw members are in centric relation, the said shoulders bear against said spherical condylar elements and said spherical elements against the stops 26. This prevents transverse movement of at least the rear end of the upper jaw member under all adjustments of the articulator so long as the centers of said spherical condylar elements coincide with the axes of the disks 20 in which they are located.

The said rods or shafts are threaded into or otherwise fastened to the opposite laterally-directed extensions 29 so that they practically form a part of the upper jaw member and serve as a pivot for the same. Secured to the under side of the upper jaw member 27 is a mounting 33 to which the base of an upper denture or model is to be secured, said mounting being held in position by a thumb screw 34 passed through the upper jaw member and threaded into said mounting. The upper jaw member has a depending portion 35 at its front end in which an incisal pin or stem 36 is adjustably fitted. The said pin or stem is held in any adjusted position by means of a thumb screw 37 extending into said depending portion and bearing against said pin or stem. The lower end of this incisal pin or stem is tapered, as at 38, and adapted for co-action with the incisal guide device 12 and adjusted as clearly set out in the aforesaid Patent No. 1,668,845. The slots or guideways 21 in the disk 20 are normally in horizontal position, and since these disks are adapted to be rotatably adjusted within the condylar heads, the said slots or guideways may be positioned at an angle to the horizontal, either above or below the latter.

For the purpose of readily determining the exact angularity or inclination of these slots or guideways, each disk may have an indicating mark formed thereon, and the condylar head a segmental series of graduation marks; but since this forms no part of my invention and is fully described in the aforesaid patent, the operation and adjustment of parts can be easily determined. The centers of the spherical condylar elements 25 may be compared with the condyle socket centers of the human maxillae, and when the incisal pin or stem 36 rests on the incisal guide 12 and the spherical condylar elements are against the stops 26, the dentures or models secured to the mountings 13 and 33 are held in the position of centric relation in the articulator.

The construction described permits construction of the jaw members and manipulation of the same to meet the requirements of the particular individual for whom the dentures or other fittings are to be provided, all of which is clearly set out in the aforesaid patent. Very often a lower denture or model is unintentionally mounted with respect to the upper in protruded relation on the articulator, and under such conditions the spherical condylar elements 25 are spaced somewhat from the stops 26. Should one of these spherical condylar elements only be in touch with its co-operating stop, there would be a lateral deviation from the centric relation of the dentures or models mounted on the jaw members. It will be clear that the relation from the condylar axis of the articulator changes with every position, and for this reason I have provided means, which may be termed a locking device, to lock the jaw members in centric relation, regardless of what position the condylar posts 11 or the disks adjustable in the upper ends of the posts are in. With this in view I have provided lock latches 39, one for each condylar head. Each latch comprises two angular arms 40, 41 disposed at an angle to each other; the arm 40 being straight-lined and having its lower end pivotally secured to the disk within the co-operating condylar head, and its other arm 41 being formed arcuate and describing an arc of a circle having a pivot 42 as its center. The arcuate or curved arm 41 is provided with a slot 43 through which is passed a screw stud 44 fastened into the disk 20 and which projects outwardly from said disk. Surrounding said screw stud is a washer 45, and threaded onto the outer projecting portion of said stud is a thumb nut 46 which, when tightened against the washer,

will cause the latter to firmly press the locking device against the side of the disk and condylar head in any position to which said locking device may be positioned. The forward edge of the straight-lined arm **40** serves as a contact face for the projecting ends of the pivot rods **30**, and thus, regardless of the angularity to which the condylar heads may be positioned, the locking devices will serve to hold the spherical condylar elements **25** against their respective stops **26**. When the articulator is locked by these locking devices, the only movement possible would be a rotating movement of the upper jaw member around the articulator condylar axis. Thus, regardless of the adjustment of the condylar posts and consequently the angularity of the condylar heads, and also regardless of the rotative adjustment of the disks **20** within the condylar heads, centric relation of the jaw members is assured.

Without the use of these locking devices it has been necessary to adjust the condylar heads in parallel relation and parallel with the longitudinal center of the articulator, and even under such conditions, through carelessness of the operator, it was possible to have one of the spherical condylar elements move away from its co-operating stop, with the result that when mounting dentures or models on the jaw members, and particularly the lower denture or model with respect to the upper, the lower denture or model would be off centric relation. It has also been found that operators inadvertently overlooked positioning condylar heads against stops **26** when the last use of the articulator resulted in a positioning of these heads otherwise. Therefore, the locking of the pivot rods or shafts by means of my improved locking device assures a centric relation of the jaw members and consequently of the dentures or models regardless of the position of the condylar posts, and condylar heads or parts adjustable therein. In order, therefore, to guard against any mishap in the mounting of the dentures or models on the respective jaws of the articulator, the operator first locks the condylar elements **25** against the stops **26** provided in the disks **20**. He then proceeds to secure the dentures or models to their respective jaw members with assurance they will be fastened in centric relation, after which the locking devices may be unlocked and moved out of the way. The angularity of the two arms forming each of the locking devices provides V-shaped spaces between them which permits lateral and protrusive excursions of the condylar elements and the projecting ends of the shafts without any interference, said shafts being also referred to hereinafter as pivot extremities.

While I have shown my improvements as applied to the articulator shown in Patent No. 1,668,845, it will be understood that such improvements may be applied to any universally operated articulator embodying the principles set out in the articulator of said patent.

Having thus described my invention, what I claim is:

1. In a dental articulator having a horizontally pivoted jaw member provided with opposite projecting pivots, and spaced-apart condylar heads rotatably adjustable on an axis at an angle to the horizontal and through which the pivots of said jaw member extend; a lock device pivotally secured to each of said condylar heads, each having a straight-lined arm extending from its pivotal point and engaging the pivots of said jaw member and an arcuate arm extending from the free end of said straight-lined arm and describing an arc of a circle having the pivot of said lock device as its center, said arcuate arm having a slot formed lengthwise therein, and means passing through said slot for locking said arm in desired position.

2. In a dental articulator having spaced-apart condylar heads rotatable on vertical axes and disks rotatable within said heads having guideways extending inwardly from their peripheries and a horizontally pivoted jaw member having its pivots extending through the guideways of said disks; locking means to maintain said jaw member in centric relation irrespective of the rotative adjustment of said condylar heads or the adjustment of said disks within said heads comprising an angular lock arm for each of said disks, each lock arm having a straight-lined member pivotally secured to the outer face of its co-operating disk and a member extending forwardly from said straight-lined member and having an arcuate slot formed therein whose center is the pivot of its lock arm, and a locking element co-operating with said slot to lock said lock arm in either locking or unlocking position, one edge of said straight-lined member bearing against the pivots of said jaw member to maintain them at the ends of their movements in one direction within said guideways and to assure centric maintenance of said jaw member.

3. In a dental articulator having a pivoted jaw member provided with opposite projecting pivots, and spaced-apart condylar heads rotatably adjustable at an angle to the horizontal and having elements therein rotatable on horizontal axis through which the pivots of said jaw member extend and in which they are radially adjustable; a lock device pivotally secured to each of said condylar heads co-acting with the pivot projecting through the latter, each lock device having an arcuate slot whose center is the pivot of the lock device in which it is formed and having also clearance to enable its adjustment with respect to the co-acting pivot of said jaw member, the clearances of said lock devices forming stops thereon to be engaged by the pivots of said jaw members, and means on the rotatable elements within said condylar heads passing through said arcuate slots for fastening said lock devices in desired positions.

EDMOND J. FRANWICK.