

April 6, 1965

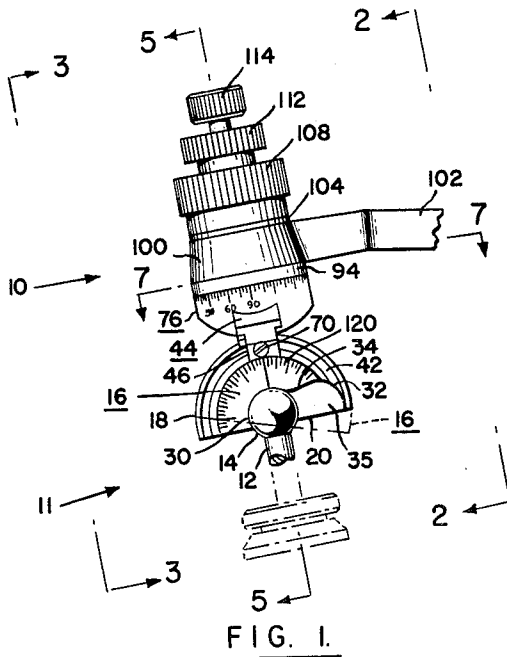
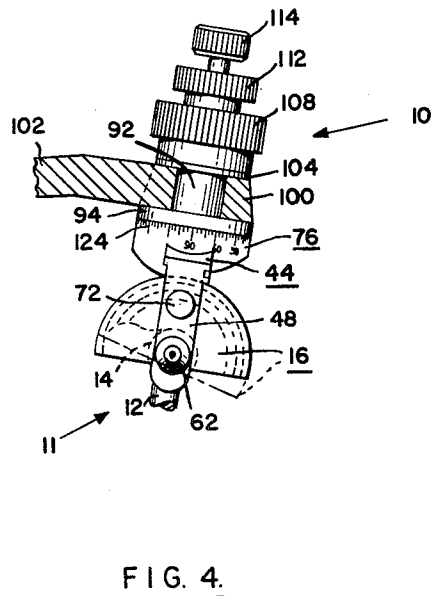
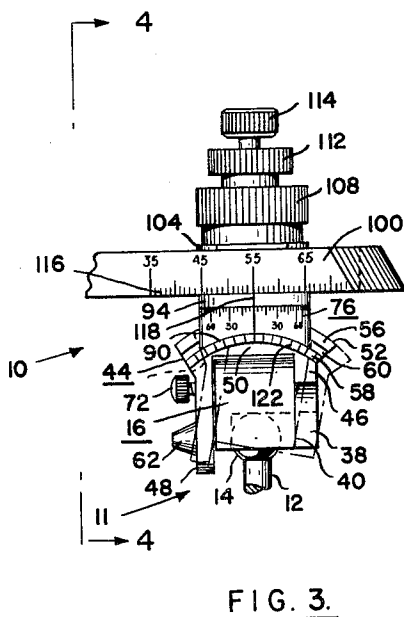
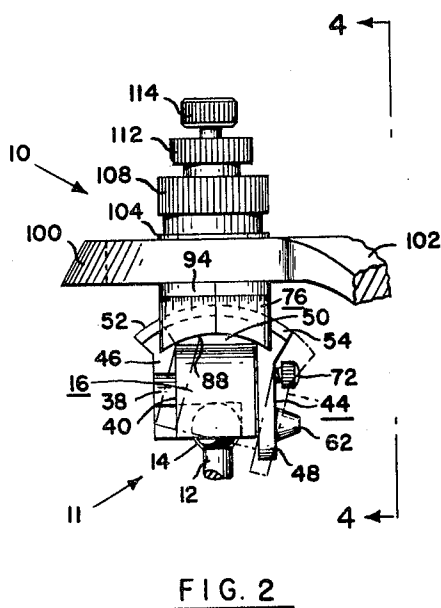
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HINGE JOINT FOR DENTAL ARTICULATOR

Filed March 30, 1961

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

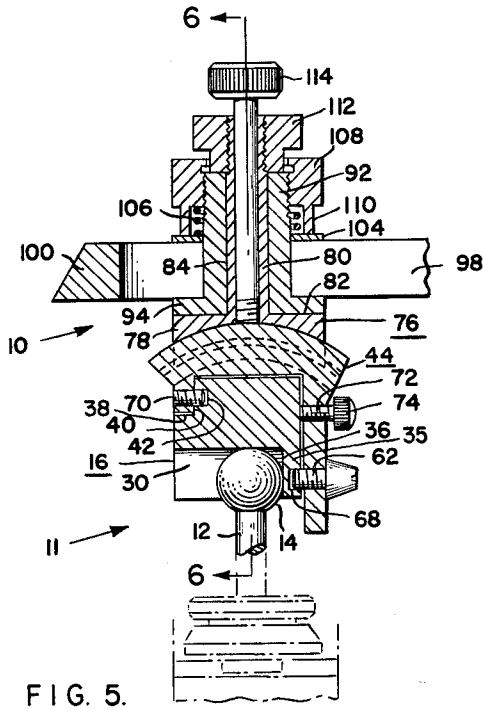


FIG. 5.

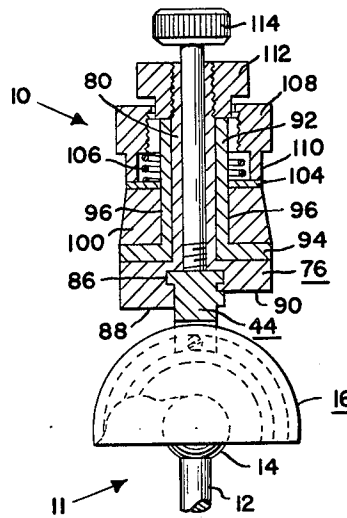


FIG. 6.

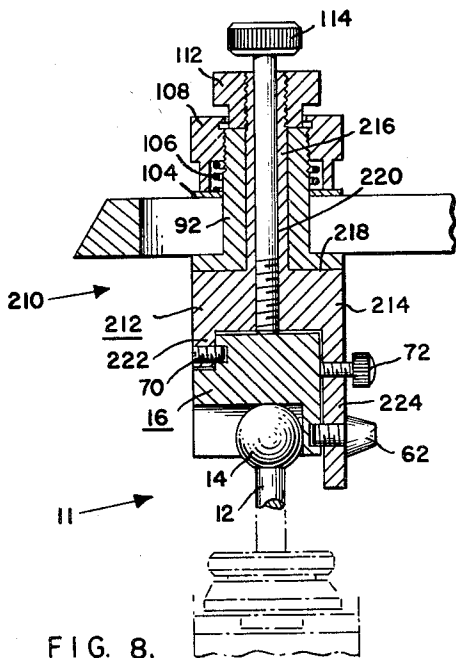


FIG. 8.

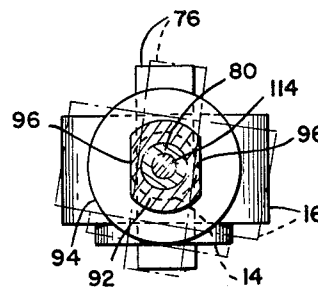


FIG. 7.

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HINGE JOINT FOR DENTAL ARTICULATOR
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7 Claims. (Cl. 32—32)

The present invention relates generally to dental articulators, and particularly to an improved form of hinge joint for the dental articulator disclosed in my copending application for United States Letters Patent Serial No. 856,425, filed December 1, 1959, now Patent No. 3,019,530.

It is conventional to provide dental articulators with a pair of hinge joints each having a hinge part that is adjustable about a principal axis and also laterally of the instrument, but known hinge parts suffer the disadvantage that after either of the adjustments aforesaid is effected, the other cannot be made without exposure to the danger of disturbing the first. Accordingly, an object of the invention is to provide a dental articulator having hinge parts of the adjustable type aforesaid with locking means operable for effecting either of said adjustments after the other adjustment is effected, without exposure to the danger of disturbing the adjustment first made.

Another object is to provide a dental articulator having hinge parts that are universally adjustable and also laterally adjustable transversely of the instrument with locking means operable for effecting any possible adjustment after any one or more of the other possible adjustments are effected, without exposure to the danger of disturbing the adjustment or adjustments first made.

Other objects of the invention will become apparent when the following description is read with reference to the accompanying drawings, in which:

FIGURE 1 is a side view of a hinge joint embodying the invention;

FIGURE 2 is a front view of the joint shown in FIGURE 1, as indicated by line 2—2 in FIGURE 1;

FIGURE 3 is a rear view of the hinge joint, as indicated by line 3—3 of FIGURE 1;

FIGURE 4 is a vertical section on line 4—4 of FIGURE 2 or FIGURE 3;

FIGURE 5 is an enlarged section on line 5—5 of FIGURE 1;

FIGURE 6 is a section on line 6—6 of FIGURE 5;

FIGURE 7 is a section on line 7—7 of FIGURE 1; and

FIGURE 8 is a longitudinal section similar to FIGURE 5, but showing a modified form of the hinge joint.

Referring particularly to FIGURES 1 to 7, my improved hinge joint for dental articulators comprises an upper hinge part generally designated 10 seated upon a lower hinge part generally designated 11. The lower hinge part 11 is provided with a neck 12 terminating in a spherical element 14.

The hinge part 10 comprises a condylar guide in the form of an upright substantially thick, flat disc, generally designated 16, overlying the spherical element 14. The disc 16 has an arcuate peripheral upper edge 18 and a straight peripheral lower edge 20. The lower edge of the disc 16 is undercut to form a downwardly facing curvilinear condylar guide surface having a posterior portion 30 which is concave downwardly, an anterior portion 32 which is concave downwardly and a connecting portion 34 which is convex downwardly and smoothly merged with portions 30 and 32. The undercut also forms, on the inner side of the disc 16, an upright abutment 35 having an outwardly facing abutment surface 36. On the outer side of the disc 16 is a recess extending along the arcuate edge 18 and having an upwardly facing arcuate surface 38 and an upright outwardly facing surface

40. The upright surface 40 is provided with an arcuate groove 42.

Embracing the disc 16 is a yoke part of inverted U-shape, generally designated 44. The yoke part is provided on the outer side of the hinge joint with a short leg 46 and on the inner side of the hinge joint with a long leg 48, these legs being connected by a portion 50. The upper periphery of the yoke part is arcuate, as at 52, and is provided with a pair of opposite side flanges 54 and 56. On the rear side of the hinge joint the yoke part is provided with an arcuate rib 58 radially spaced inwardly from the flange 56 to form between the flange 56 and the rib 58 an arcuate groove 60.

A pin 62 is threaded into the leg 48 of the yoke part and the end thereof is received by a depression 68 formed in the disc 16. Another pin 70 is threaded into the short leg 46 of the yoke part and the end thereof is received by the groove 42 in the disc 16. Also threaded into the long leg 48 of the yoke part is a lock screw 72 having a knurled head 74 and engaging the disc 16.

Overlying the yoke part 44 is a second yoke part, generally designated 76, provided with a cylindrical body 78 from which a hollow stem 80 extends upwardly. At the juncture of the body 78 and stem 80 is a circumferentially extending shoulder 82. The hollow interior of the stem 80, designated 84, communicates with an underlying arcuate recess 86 which is T-shaped in transverse section. On one side of the recess 86 the cylindrical body 78 is provided with an arcuate undersurface 90. The arcuate opposite side of the recess 86 the cylindrical body 78 is provided with an arcuate undersurface 90. The arcuate upper peripheral portion of the yoke part 44 is slidably fitted into the recess 86, as shown.

The stem 80 of the yoke part 76 extends through a sleeve 92 which is provided with a radially outwardly extending flange 94 at the lower end thereof. Diametrically opposite side surfaces of the sleeve 92 are flat, as at 96, and the sleeve 92 extends upwardly freely through an elongated opening 98 formed in a wing 100 of the upper bow member 102 of the instrument.

Fitted over the sleeve 92 is a flat washer 104 and a coil compression spring 106. Threaded upon the upper end of the sleeve 92 is a lock nut 108 provided with a hollow cylindrical apron 110 housing the spring 106 and seated upon the washer 104. Threaded upon the upper end of the stem 80 is a lock nut 112 which engages with the upper end of the sleeve 92. A lock screw 114 extends freely through the major portion of the stem 80 and is threaded into the lower end portion of the stem 80 for engagement with the arcuate surface 52 of the yoke part 44.

The axis of the pin 62 and that of the lock screw 114 intersect at the center of the spherical element 14, and the center of curvature of the arcuately shaped recess 86 in the yoke part 76 and of the arcuately shaped peripheral portion of the yoke part 44 slidably fitted in the recess 86 is at the center of the spherical element 14.

As described and shown, no element of the upper hinge part 10 is movable relative to the upper bow member 102. In other words, the upper hinge part 10 is effectively locked in position. The disc 16 overlies the spherical element 14 with the abutment surface 36 engaging the inner side of the spherical element 14 and with the spherical element 14 nested in the concave portion 30 of the condylar guide surface.

The lock screw 72 engages the disc 16 and presses it against the short leg 46 of the yoke part 44, in consequence of which the disc 16 is frictionally secured or locked against movement relative to the yoke part 44. The lock screw 114 engages the yoke part 44 and urges it downwardly relative to the yoke part 76, in consequence of which the yoke part 44 is frictionally secured or locked

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against movement relative to the yoke part 76. The lock nut 112 draws the shoulder 82 of yoke part 76 upwardly against the flange 94 of the sleeve 92, in consequence of which the yoke part 76 is secured or locked against movement relative to the sleeve 92. The sleeve 92 cannot turn about its longitudinal axis relative to the upper bow member because its flat diametrically opposite surfaces 96 fit snugly between opposite sides of the elongated opening 98. The lock nut 108 draws the flange 94 of sleeve 92 upwardly against the bottom of the wing 100 of the bow member 102, in consequence of which the sleeve 92 is secured or locked against movement longitudinally of the elongated opening 98.

In order to suitably adjust the instrument and effectively lock it in adjusted position, the lower hinge part 11 is moved to the desired position laterally of the instrument. Then the nut 108 is loosened, whereupon the spring 106 acts to secure the sleeve 92 against moving axially downwardly relative to the bow member 102. The hinge part 10 is moved as a unit laterally of the instrument to bring the abutment surface 36 of the disc 16 into engagement with the inner side of the spherical element 14. To aid in positioning the hinge part 10 laterally of the instrument a suitable scale 116 is inscribed on the back of the wing 100 and an index mark 118 is inscribed on the flange 94 of the sleeve 92. With the hinge part 10 in the adjusted position, the lock nut 108 is retightened against the influence of the coil spring 106.

Now the lock screw 72 is loosened and the disc 16 is tilted about the pin 62 fore and aft to the desired position, the disc being guided by pin 70 working in groove 42. Suitable means, indicated at 120, are provided to aid in adjusting the disc 16. With the disc 16 in the adjusted position, the screw 72 is retightened. In FIGURE 1, the disc 16 is shown in phantom tilted downwardly and forwardly, and in FIGURE 4 the disc is shown in phantom tilted downwardly and rearwardly.

Now the lock screw 114 is loosened and the disc 16 and yoke part 44 are tilted laterally of the instrument as a unit to the desired position, the movement being, of course, about the center of the spherical element 14. Suitable markings, indicated at 122, are provided to aid in making the adjustment. With the disc 16 and yoke part 44 in the desired tilted position, the lock screw 114 is retightened. In FIGURE 2, the disc 16 and yoke part 44 are shown in phantom tilted laterally inwardly, and in FIGURE 3 they are shown in phantom tilted laterally outwardly.

Now the lock nut 112 is loosened and the yoke part 76 is turned in sleeve 92 to the desired position. The yoke part 44 and the disc 16 turn with the yoke part 76 as a unit. Suitable means, indicated at 124, are provided to aid with this adjustment. With the yoke part 76 in the adjusted position, the lock nut 112 is retightened. In FIGURE 7, the yoke parts 44 and 76 are shown in phantom turned about the axis of the hinge part 10.

It is to be noted that the hinge part 10 may be unlocked for effecting any one of the several adjustments aforesaid without also making it possible to disturb any previously made adjustment. In other words, when one of the locking elements is loosened, only one adjustment is possible. Each adjustment is made entirely independently of the others.

When the instrument is properly adjusted, the upper and lower bow members may be opened and closed and shifted relative to one another fore and aft and laterally with the inner side of the spherical element 14 always engaged with the abutment surface 36 of the disc 16 and with the top of the spherical element 14 always engaged with the condylar guide surface.

Now referring to FIGURE 8, in the modified form of the hinge joint the same numerals are used to indicate elements that are identical with corresponding elements of the embodiment of FIGURES 1 to 7. The hinge joint comprises the hinge part 11 underlying a hinge part 210.

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The hinge part 210 comprises the disc 16 and a one-piece yoke 212. The yoke includes a cylindrical body 214 from which there extends upwardly a stem 216 having a hollow interior. At the juncture of the stem 216 and the cylindrical body 214 is a circumferentially extending shoulder 218. Depending from the cylindrical body 214, on the outer side of the hinge joint, is a short leg 222, and on the inner side of the cylindrical body 214, a long leg 224.

The disc 16 is pivoted upon the pin 62, which is threaded through the long leg 224. The pin 70 is threaded through the short leg 222 and serves to guide the disc 16. The screw 72 is threaded through the long leg 224 and engages the disc 16. The stem 216 of the yoke extends through the sleeve 92, which projects upwardly freely through the slot 98 in the wing 100 of the bow member 102. Fitted over the sleeve 92 are the washer 104 and the coil spring 106. Threaded upon the sleeve 92 is the lock nut 108, and threaded upon the stem 216 is a lock nut 112. Extending freely into the stem 216 is the lock screw 114 threaded into the lower end portion of the stem 216 and bearing upon the disc 16.

Disc 16 overlies the spherical element 14 and its abutment surface 36 engages the inner side of the spherical element 14, the spherical element being nested in the concave portion 30 of the condylar guide surface.

Lock screws 72 and 114 engage disc 16 and secure or lock the same against movement relative to the yoke 212. The lock nut 112 draws shoulder 218 of yoke 212 upwardly against the flange 94 of the sleeve 92, in consequence of which the yoke 212 is secured or locked against movement relative to the sleeve 92. As already described in connection with the embodiment of FIGURES 1 to 7, the sleeve 92 is incapable of turning about its axis relative to the upper bow member, and the lock nut 108 secures or locks the sleeve 92 against movement longitudinally of the slot 98.

For adjusting the instrument, the lower hinge part 11 is moved to the desired position laterally of the instrument. Now the lock nut 108 is loosened and the hinge part 10 shifted laterally of the instrument to bring the abutment surface 36 of the disc 16 into engagement with the inner side of the spherical element 14, whereupon the lock nut 108 is retightened. Next the screws 72 and 114 are loosened and the disc 16 is tilted fore and aft to the desired position, whereupon the screws 72 and 114 are retightened. The pin 70 working in the groove 42 guides the disc 16. Finally, the lock nut 112 is loosened and the yoke 212 turned in sleeve 92 to the desired position. Of course, the yoke carries with it the disc 16. Now the lock nut is retightened.

In view of the detailed description of the construction and operation of the embodiment of FIGURES 1 to 7 given hereinbefore, a more detailed description of the construction and operation of the embodiment of FIGURE 8 is deemed unnecessary for a full understanding of the invention.

It will be understood, of course, that the present invention is susceptible of various modifications which may be made without departing from the general principles of the invention. Accordingly, it is intended to claim the same broadly as well as specifically, as indicated by the appended claims.

What is claimed is:

1. In a dental articulator, a lower bow member, an upper bow member, and means for mounting said upper bow member upon said lower bow member including a pair of laterally spaced hinge-type joints, each of said hinge-type joints including a hinge part carried by said lower bow member, and a hinge part carried by said upper bow member including a sleeve mounted upon said upper bow member for lateral shifting movement, means securing said sleeve against turning movement about its longitudinal axis, means releasably clamping said sleeve to said upper bow member thereby to secure said

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sleeve against shifting and tipping movement, said clamping means being independent of the first mentioned means securing said sleeve against turning movement, a yoke extending into and turnably received by said sleeve, means releasably clamping said yoke to said sleeve thereby to secure said yoke against turning in said sleeve, an element carried by said yoke and having an undersurface which bears upon the first mentioned hinge part, said element being mounted for tilting movement with said undersurface in contact with the first mentioned hinge part, and means releasably securing said element against tilting movement.

2. In a dental articulator, a lower bow member, an upper bow member, and means for mounting said upper bow member upon said lower bow member including a pair of laterally spaced hinge-type joints, each of said hinge-type joints including a hinge part carried by said lower bow member, and a hinge part carried by said upper bow member including a sleeve extending through and mounted upon said upper bow member for lateral shifting movement, means securing said sleeve against turning movement about its longitudinal axis, means releasably clamping said sleeve to said upper bow member thereby to secure said sleeve against shifting and tipping movement including means on said sleeve abutting the undersurface of said upper bow member, and a locking element on said sleeve drawing said abutting means tight against the undersurface of said upper bow member, said clamping means being independent of the first mentioned means securing said sleeve against turning movement, a yoke extending into and turnably received by said sleeve, means releasably clamping said yoke to said sleeve thereby to secure said yoke against turning in said sleeve, an element carried by said yoke and having an undersurface which bears upon the first mentioned hinge part, said element being mounted for tilting movement with said undersurface in contact with the first mentioned hinge part, and means releasably securing said element against tilting movement.

3. In a dental articulator, a lower bow member, an upper bow member, and means for mounting said upper bow member upon said lower bow member including a pair of laterally spaced hinge-type joints, each of said hinge-type joints including a hinge part carried by said lower bow member, and a hinge part carried by said upper bow member including a sleeve projected freely through an elongated opening extending transversely of said upper bow member and mounted upon said upper bow member for movement longitudinally of said opening, means securing said sleeve against turning movement, means releasably clamping said sleeve to said upper bow member thereby to secure said sleeve against shifting and tipping movement including a flange on said sleeve abutting the undersurface of said upper bow member, and a lock nut threaded on said sleeve and drawing said flange tight against the undersurface of said upper bow member, said clamping means being independent of said means securing the sleeve against turning movement, a yoke extending into and turnably received by said sleeve, means releasably clamping said yoke to said sleeve thereby to secure said yoke against turning in said sleeve, an element carried by said yoke and having an undersurface which bears upon the first mentioned hinge part, said element being mounted for tilting movement with said undersurface in contact with the first mentioned hinge part, and means releasably securing said element against tilting movement.

4. In a dental articulator, a lower bow member, an upper bow member, and means for mounting said upper bow member upon said lower bow member including a pair of laterally spaced hinge-type joints, each of said hinge-type joints including a hinge part carried by said lower bow member, and a hinge part carried by said upper bow member including a sleeve mounted upon said upper bow member for lateral shifting movement,

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means securing said sleeve against turning movement about its longitudinal axis, means releasably clamping said sleeve to said upper bow member thereby to secure said sleeve against shifting and tipping movement, said clamping means being independent of the first mentioned means securing said sleeve against turning movement, a yoke extending into and turnably received by said sleeve, means releasably clamping said yoke to said sleeve thereby to secure said yoke against turning in said sleeve including means on said yoke abutting a lower end portion of said sleeve, and a locking element on said yoke drawing said abutting means tight against said lower end portion of the sleeve, an element carried by said yoke and having an undersurface which bears upon the first mentioned hinge part, the last mentioned element being mounted for tilting movement with said undersurface in contact with the first mentioned hinge part, and means releasably securing said last mentioned element against tilting movement.

5. In a dental articulator, a lower bow member, an upper bow member, and means for mounting said upper bow member upon said lower bow member including a pair of laterally spaced hinge-type joints, each of said hinge-type joints including a hinge part carried by said lower bow member, and a hinge part carried by said upper bow member including a sleeve mounted upon said upper bow member for lateral shifting movement, means securing said sleeve against turning movement about its longitudinal axis, means releasably clamping said sleeve to said upper bow member thereby to secure said sleeve against shifting and tipping movement, said clamping means being independent of the first mentioned means securing said sleeve against turning movement, a yoke including a section having a stem extending into and turnably received by said sleeve, and a section mounted upon said turnable yoke section for tilting movement laterally of said articulator, means releasably clamping said turnable yoke section to said sleeve thereby to secure the same against turning in said sleeve, means releasably securing said tiltable yoke section against movement relative to said turnable yoke section, an element carried by said tiltable yoke section and having an undersurface which bears upon the first mentioned hinge part, said element being mounted for tilting movement fore and aft with said undersurface in contact with the first mentioned hinge part, and means releasably securing said element against movement relative to said tiltable yoke section.

6. In a dental articulator, a lower bow member, an upper bow member, and means for mounting said upper bow member upon said lower bow member including a pair of laterally spaced hinge-type joints, each of said hinge-type joints including a hinge part in the form of a spherical element carried by said lower bow member, and a hinge part carried by said upper bow member including a sleeve mounted upon said upper bow member for lateral shifting movement, means securing said sleeve against turning movement about its longitudinal axis, means releasably clamping said sleeve to said upper bow member thereby to secure said sleeve against shifting and tipping movement, said clamping means being independent of the first mentioned means securing said sleeve against turning movement, a yoke including a section having a tubular stem extending into and turnably received by said sleeve, the longitudinal axis of said stem extending through the center of said spherical element, and a section slidably fitted into said turnable yoke section for tilting movement laterally of said articulator about an axis extending through the center of said spherical element, means releasably clamping said turnable yoke section to said sleeve thereby to secure the same against turning in said sleeve, means extending through said stem and engaging said tiltable yoke section to releasably secure the same against movement relative to

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said turnable yoke section, an element carried by said tiltable yoke section and having an undersurface which bears upon said spherical element, the element carried by said tiltable yoke section being mounted for tilting movement fore and aft of said articulator about an axis extending through the center of said spherical element and with said undersurface in contact with said spherical element, and means releasably securing the element carried by said tiltable yoke section against movement relative to said tiltable yoke section.

7. In a dental articulator, a lower bow member, an upper bow member, and means for mounting said upper bow member upon said lower bow member including a pair of laterally spaced hinge-type joints, each of said hinge-type joints including a hinge part in the form of a spherical element carried by said lower bow member, and a hinge part carried by said upper bow member including a sleeve mounted upon said upper bow member for lateral shifting movement, means securing said sleeve against turning movement about its longitudinal axis, means releasably clamping said sleeve to said upper bow member thereby to secure said sleeve against shifting and tipping movement, said clamping means being independent of the first mentioned means securing said sleeve against turning movement, a one-piece yoke having a stem extending into and turnably received by said

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sleeve, the longitudinal axis of said stem extending through the center of said spherical element, means releasably clamping said yoke to said sleeve thereby to secure the same against turning in said sleeve, an element carried by said yoke and having an undersurface engaging said spherical element, the element carried by said yoke being mounted for tilting movement fore and aft of said articulator about an axis extending through the center of said spherical element and with said undersurface in contact with said spherical element, and means releasably securing the element carried by said yoke against movement relative to said yoke.

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RICHARD J. HOFFMAN, *Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,176,400

April 6, 1965

Anthony J. De Pietro

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 29, for "90. The arcuate" read -- 88,
and on the --.

Signed and sealed this 22nd day of February 1966.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents