July 8, 1947. A. SHMUKLER ET AL 2,423,522

ARTICULATOR

Filed May 4, 1945

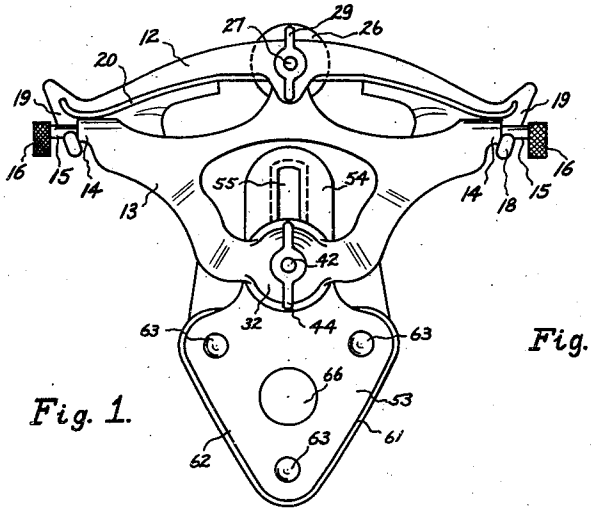


Fig. 1.

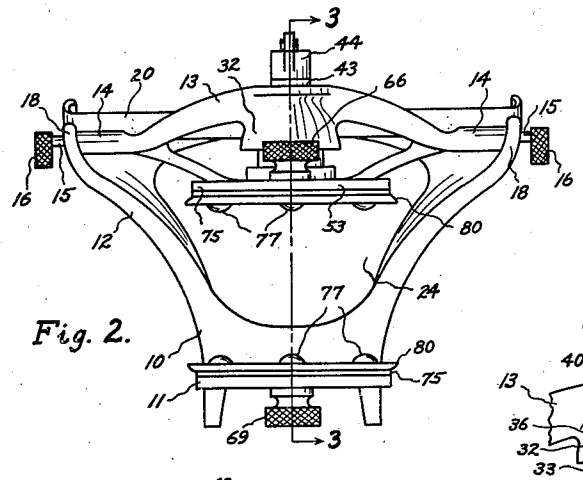


Fig. 2.

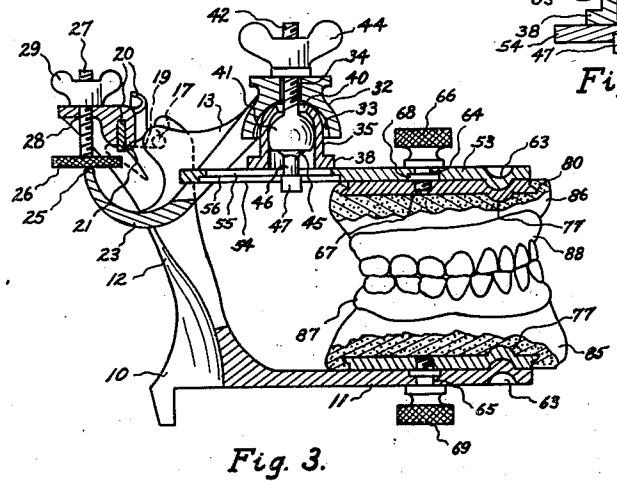


Fig. 3.

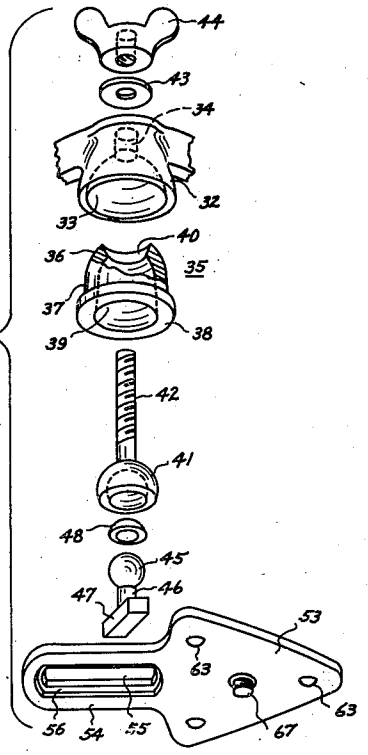


Fig. 4.

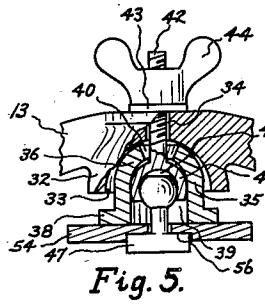


Fig. 5.

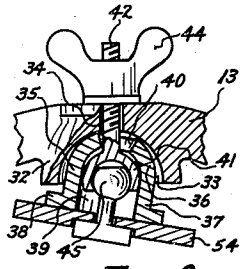


Fig. 6.

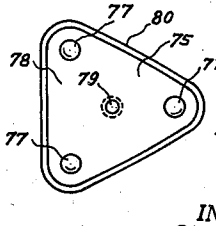


Fig. 7.

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ARTICULATOR

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3 Claims. (Cl. 32—32)

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This invention relates to the art of denture construction, and more particularly, relates to dental articulators.

In the art of mechanical dentistry, models of human jaws are mounted on an articulator to reproduce the natural relative positions of the jaws. An essential requirement is that the jaw models be mounted on the articulator in such manner that centric occlusion is simulated. The correct bite registration is often not obtained on initial mounting on the articulator. Consequently it is desirable that provision be made for adjustment of the relative configuration of the jaw models on the articulator. In articulators heretofore available, it was not possible to adjust this relative configuration short of reinvestment of the jaw models in plaster or recasting of the jaw models.

One of the main objects of our invention is to provide a dental articulator for mounting jaw models, in which the relative configuration of the models can be adjusted in all possible directions with utmost ease and simplicity.

Another object of our invention is to supply an articulator in which the jaw models are detachably mounted without plaster investment and in which the relative configuration of the jaws is readily adjustable.

Another object of the invention is to provide an articulator having an upper mounting plate attached to a laterally and protrusively movable hinged bracket by a locking universal joint.

A further object of our invention is to produce an articulator having an upper mounting plate attached to a hinged bracket by a locking combination universal joint and slide engagement.

Still another object of the invention is to provide an articulator having an upper plate mounted for combined locking angular and translational adjustment with a single control.

With these and other objects in view which will become apparent from the ensuing description and claims, the following describes the details of construction and combination of parts of a specific embodiment of our invention, which we illustrate as an example, and which will best be understood when read in conjunction with the accompanying drawing, in which—

Fig. 1 is a plan view of our articulator.

Fig. 2 is a front elevational view of the articulator.

Fig. 3 is a fragmentary side elevational section on the line 3—3 of Fig. 2, showing the articulator with jaw models and restorations in place thereon.

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Fig. 4 is a fragmentary perspective view, partly in section, showing the separate parts of the sliding universal joint.

Fig. 5 is a fragmentary view, partly in section, of the assembled joint of Fig. 4.

Fig. 6 is a view similar to Fig. 5, showing the parts of the joint in a different angular relation.

Fig. 7 is a plan view of the upper jaw model mounting insert.

Referring to the drawing, we have shown in Figs. 1 to 3, an articulator base 10 having a forward lower mounting plate 11 and a generally upright rear part 12. Hinged to the part 12 for oscillation on a transverse axis is a bracket 13 having laterally extending rounded ends 14 with extensions of reduced diameter forming trunnions 15 terminating in knurled knobs 16. The trunnions 15 are adapted to engage open bearings 17 formed in lateral ends 18 of the part 12, the bearings 17 having bearing ways 19 to permit a moderate degree of lateral oscillation of the bracket 13 about the ends 18 as pivots by suitable manipulation of the knobs 16. A flat spring 20 held by a finger 21 is mounted laterally on the part 12 and bears on the ends 14 forcing the trunnions 15 into the bearings 17.

Extending rearwardly and downwardly from the middle of the bracket 13 is a member 23 which penetrates a large central aperture 24 in the part 12 and curves rearwardly and upwardly to the end 25 to engage a bearing disk 26 having a coaxial screw 27 engaging a tapped opening 28 in the part 12. The spacing of the disk 26 from the part 12 is adjusted by means of the screw 27 locked in position by a wing nut 29, and determines the lower limit of oscillable movement of the bracket 13 about the transverse axis.

Medially of the front of the bracket 13 is an integrally formed outer cup member 32 having a cup 33 on the under side and a coaxial bore 34. Within the outer cup 32 is an inner cup member 35 having an upper generally hemispherical portion 36 of outer radius slightly smaller than the cup 33 and a generally downwardly extending cylindrical portion 37 terminating in a flange 38. The inner surface of the member 35 is concentric with the outer surface to form a cup 39 with an aperture 40 of conical shape at the top, the cone being coaxial with the portion 37 and having its apex at the center of the portion 36. A ball-and-socket joint having a socket element 41 with an integrally formed screw-threaded stem 42 is positioned within the cup 39, the stem 42 extending upwardly through the aperture 40, through the

bore 34, fitted with a washer 43 and surmounted by a locking wing nut 44. The ball element 45 of the ball-and-socket joint has a generally downwardly extending stem 46 terminating in a transverse rectangular key or slide 47. Between the elements 41 and 45 is interposed a friction disk or cup 48 of leather or similar material.

An upper mounting plate 53 disposed generally horizontally, has a rearward extension 54 provided with a longitudinal slot 55 having shoulders 56. The slot 55 is wider than the narrow dimension of the slide 47 to permit insertion of the slide in the slot and the shoulders 56 are of sufficient width to engage the slide 47 when it is turned with its long dimension at right angles to the slot, to form a sliding engagement.

The relation of the parts and operation of the combined locking universal and slide joint is as follows: As the nut 44 is tightened, the stem 42 is pulled upwardly, the pull being transmitted to the slide 47 through the socket 41, the ball 45 and the stem 46. The slide 47 pushes the extension 54 upwardly into engagement with the flange 38 causing the inner cup member 35 to move upwardly into engagement with the cup 33. Further tightening of the nut 44 merely locks the parts more firmly into the selected position. As clearly illustrated in Figs. 3, 5 and 6, the length of the stem 46 is such that there is adequate vertical clearance between the socket 41 and the cup 39. The bottom surface of the flange 38 and the top surface of the extension 54 may be suitably roughened to insure adequate frictional engagement.

The plate 53 is roughly triangular in shape conforming generally to the shape of the human jaw, the sides 61 and 62 being slightly arcuate in shape. Symmetrically disposed adjacent the triangular vertices of the plate 53 are three downwardly projecting cups 63 and in the center is a drilled hole 64 counterbored at the bottom. The lower plate 11 is similarly shaped with the cups 63 projecting upwardly and with the central drilled hole 65 counterbored at the top. A freely rotatable knurled-head thumb screw 66 is mounted in the opening 64 with the screw-threaded end 67 protruding downwardly. A retaining washer 68 fixed to screw 66 and disposed within the counterboring of the opening 64 prevents removal of the screw 66. An upwardly projecting identical screw 69 is similarly mounted in plate 11.

Two insert plates 75, similar to plate 53 in general shape, each have pressed indentations 77 formed in one surface 78 appropriately shaped and spaced to engage the cups 63 of the plates 53 and 11, and a tapped central aperture 79 for engaging the screws 66 and 69. On each insert 75 the surface opposite to the surface 78 is provided with a perimetric projection or flange 80.

The inserts 75 are cast in with the jaw models as illustrated in Fig. 3, the flanges 80 providing adequate retention. The lower jaw model 85 is instantly attachable to the plate 11 by means of screw 69, and the upper jaw model 86 to the plate 53 by means of screw 66, the cups 63 readily engaging the indentations 77 to provide proper alignment. The desired relative configuration between the jaw models is obtained by fitting the wax bite or check-bite (not illustrated) between the models 85 and 86 in the customary manner. This procedure positions the upper plate 53 exactly where it is desired to be held on the articulator when the bracket 13 is in its rest position, that is, when both trunnions 15 are at their forward limits of movement in the bearings 17.

With the bracket 13 in rest position, the upper plate 53 is then fixed in the desired relative configuration by suitably adjusting the disk 26 and tightening the nut 44. The jaw setting thus obtained is more accurate than the present method entailing investment with plaster and is capable of instant reproduction at any time as long as the nut 44 is not loosened or the adjustment of disk 26 is not changed. It is obvious that the jaw models can be removed and, with the aid of wax bites, or trial or finished dentures, for establishing the bite registration, can be replaced with accurate setting on any other of our articulators, as often as desired, for grinding in of the restorations 87 and 88 or for other purposes.

Although the invention has been shown with the jaw models 85 and 86 attached to plates 11 and 53 by means of the inserts 75 and screws 66 and 69, it is obvious that the models could be attached to plates 11 and 53 by the usual practice of plaster investment. Adjustment of bite registration would be made as previously outlined by adjusting the bearing disk 26 and the combined locking universal and slide joint. Such plaster attachment would not be quite as convenient for mail service between laboratory and dental office, but this could be partially remedied by constructing the lower mounting plate 11 to be detachably secured at the rear to the base 10 by machine screws rather than formed integrally therewith as illustrated in Fig. 3. For transportation purposes the plate 53 could be readily removed from the articulator by loosening the nut 44 and removing the slide 47 from the slot 55, and the plate 11 could be detached from the base by removing the machine screws securing it to the base 10. However, because the adjustment would be lost, reregistration with wax bites or dentures would be required to replace the models in the articulator in the desired configuration.

Although the invention has been described in considerable detail, such description is intended as illustrative rather than limiting, as other embodiments will be evident to those skilled in the art, as well as obvious modifications in construction and arrangement without departing from the spirit of the invention.

We claim:

1. A combined locking universal and slidable joint comprising in combination, an outer member having a cupped opening and a coaxial bore, a cup member comprising generally a hollow hemisphere surmounting a hollow cylinder, the hemispherical part having an aperture concentric with the cylinder and being proportioned and arranged to fit loosely within said cupped opening, a ball-and-socket joint having a socket element provided with a screw-threaded stem and having a ball element provided with a stem terminating in a transverse key, a terminal member having a slot slidably engageable with the ball stem but narrower than said key, and a lock nut, said ball-and-socket joint being mounted within said cup member and having the socket element stem protruding through the aperture in the cup member and the bore in the outer member and surmounted by said nut, and the parts being so proportioned that by tightening the nut the outer and terminal members are lockable in any of their possible relative positions.

2. A combined locking universal and slidable joint comprising in combination, a first member, a terminal member, an intermediate hollow member interposed between said first member and said terminal member, a ball-and-socket joint

having a ball element and a socket element disposed generally within said intermediate member, one of said elements being keyed to said terminal member for slidable engagement therewith and the other element being arranged to engage said first member and be pulled theretoward, and means to pull said other element toward said first member and maintain tension on said ball-and-socket joint, whereby to compress said intermediate member between said first member and said terminal member and fix said members in any of their possible relative positions.

3. In an articulator having a support for mounting a jaw model, a jaw model, an insert adapted to be cast integrally with said model and provided with a protuding flange to insure retention therein, said support being provided with three triangularly disposed projecting cups and an intermediately disposed bore, said insert having indentations appropriately shaped and spaced to engage said cups and a tapped opening aligned with the bore when said cups are engaged by

said indentations, and a thumb screw protruding through said bore and engaging the threads in said opening, whereby detachably to secure said model to said support in readily reproducible relative position.

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