Sept. 14, 1954 A. GERBER 2,688,800

DENTAL ARTICULATOR

Filed May 14, 1951 3 Sheets-Sheet 1

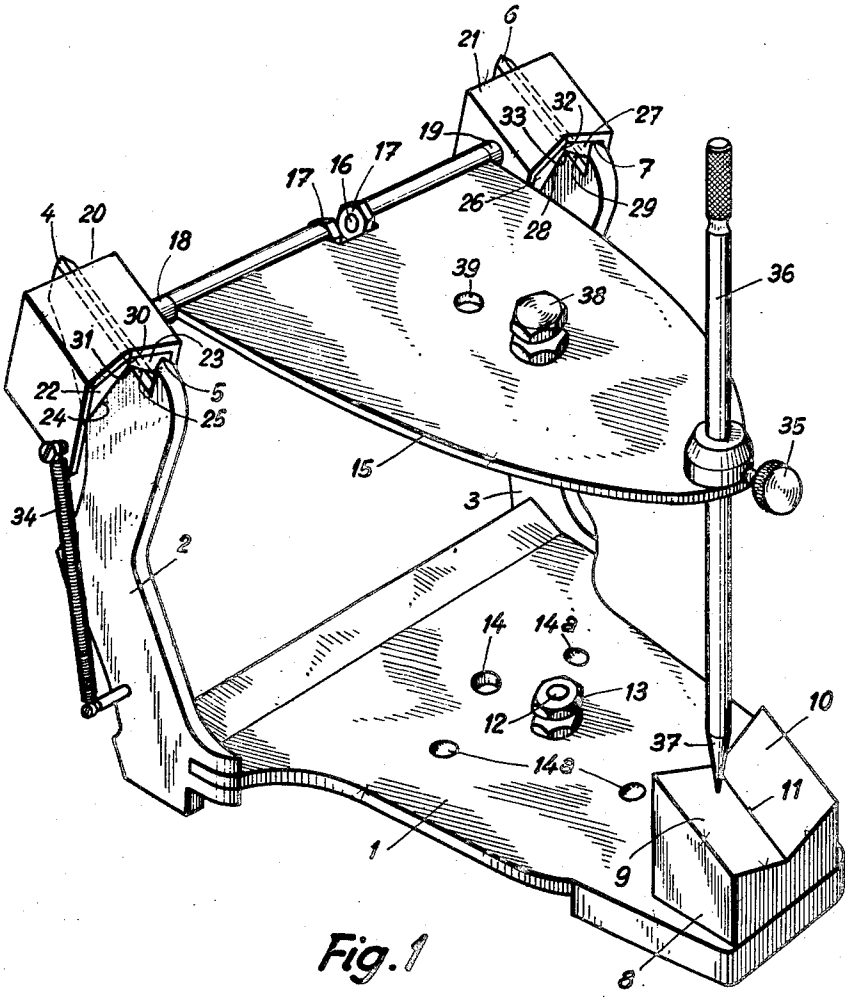


Fig. 1

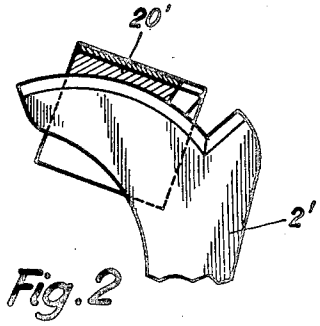


Fig. 2

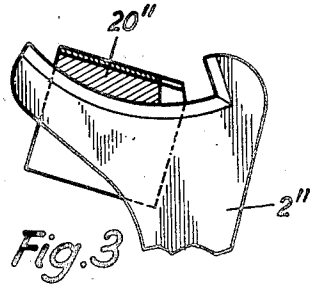


Fig. 3

INVENTOR
ALBERT GERBER
By Karlsbad & Co
Atty

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DENTAL ARTICULATOR

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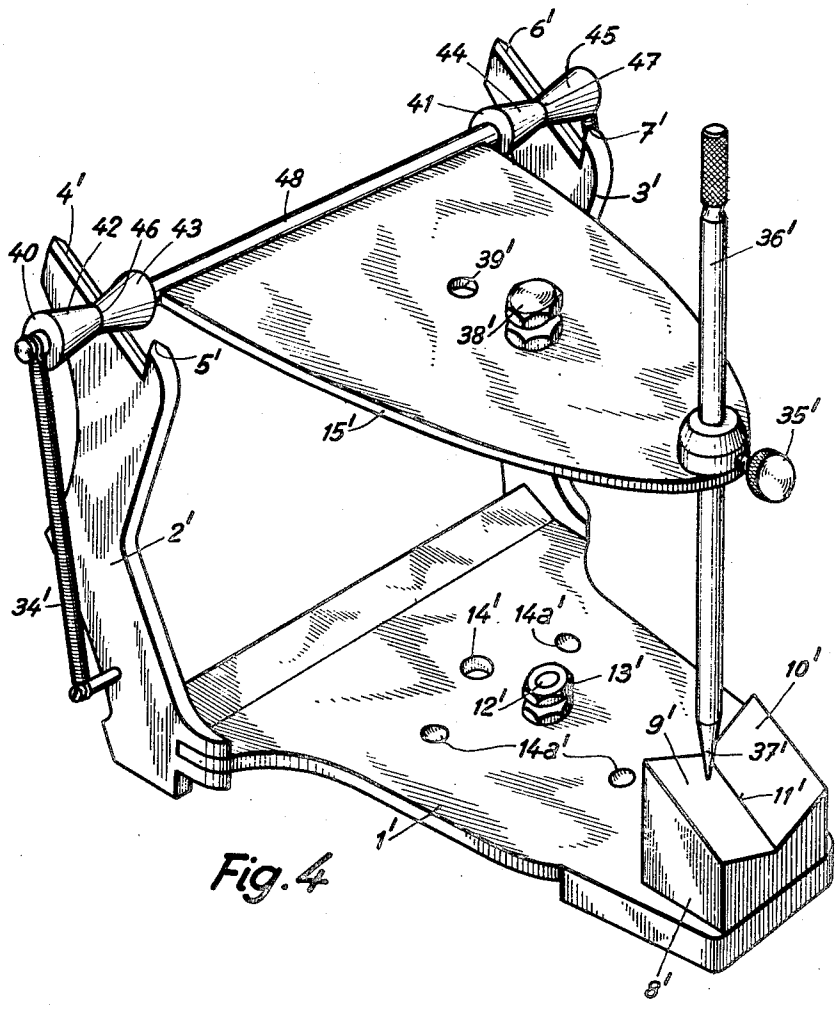


Fig. 4

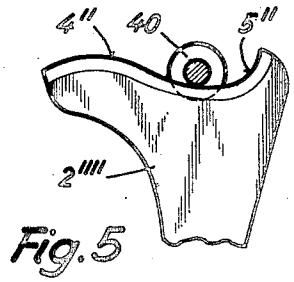


Fig. 5

INVENTOR
ALBERT GERBER
By Karelitz & Ely

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Fig.6

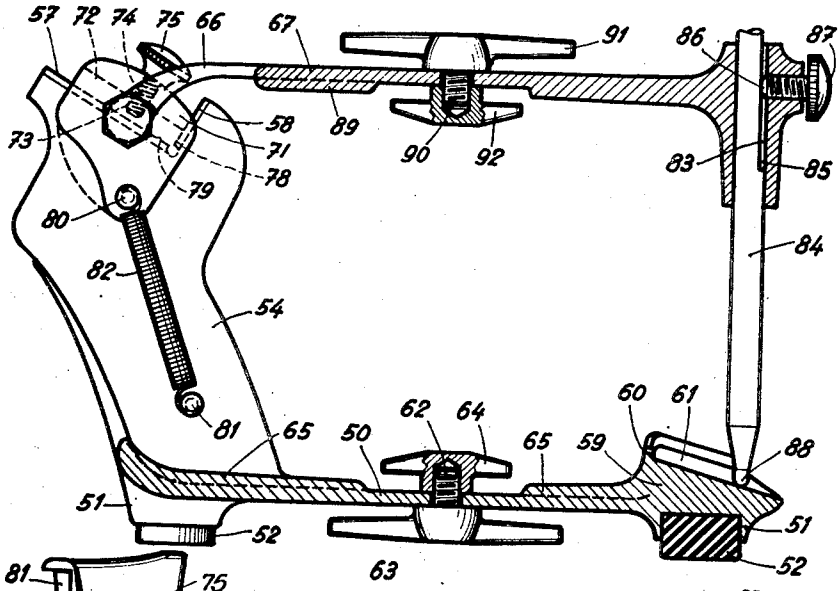


Fig.7

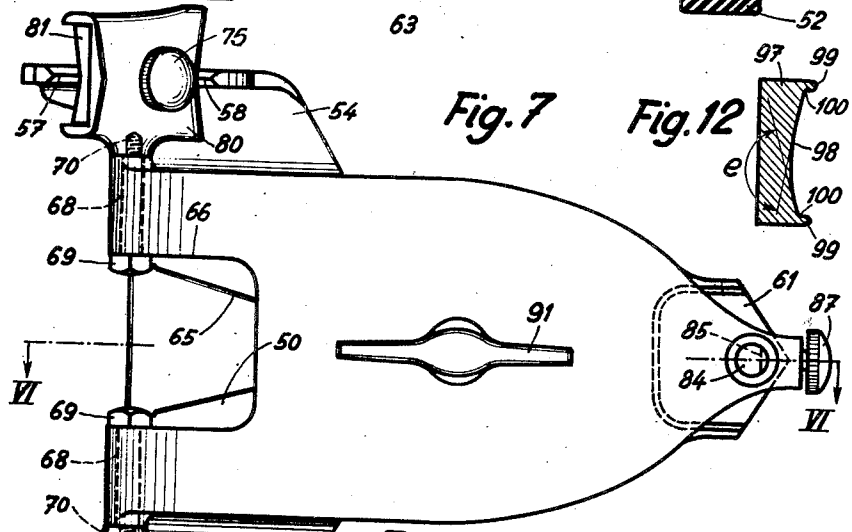


Fig.12

Fig.8

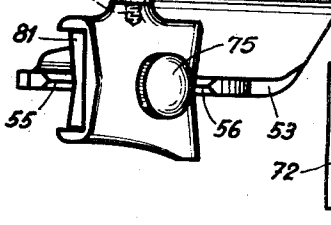


Fig.9

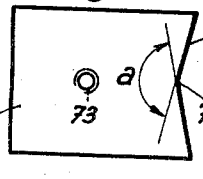


Fig.10

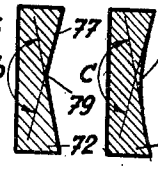
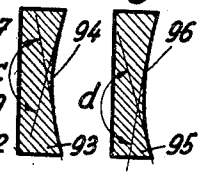


Fig.11



INVENTOR
ALBERT GERBER
By Karl Michaelis Atty

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UNITED STATES PATENT OFFICE

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DENTAL ARTICULATOR

Albert Gerber, Berne, Switzerland

Application May 14, 1951, Serial No. 226,197

Claims priority, application Switzerland
January 18, 1950

20 Claims. (Cl. 32—32)

1

This is a continuation-in-part application of my application for patent of the United States, Serial No. 148,171 filed on March 7, 1950, now abandoned.

The present invention relates to dental apparatus, and more particularly to dental articulators and the like.

In dentistry and dental research, as exact as possible a reproduction of the movements of the human jaws, for a long time, has been a desideratum in the art. As existing articulators were improved upon to allow for some additional movement which originally, had been limited to the simplest horizontal and vertical displacements, the scientific investigation of the complex mobility the jaws are capable of, progressed and disclosed an ever widening range of movements so as to cause even improved devices to prove inadequate by advanced standards.

It is an object of this invention to provide articulators which have a capacity of movement or mobility, substantially approximating that of the human jaws, as known from the most modern research.

It is a further object of this invention to provide articulators of the kind described where a maximum mobility or capacity of movement, is accompanied by the prevention of unnatural, or insufficiently controlled motions.

Another object of this invention is to provide articulators capable of the full spectrum of tri-dimensional movements recognized to be within the capacity of movement of the human jaws, which are adaptable and adjustable according to the great variety of individual requirements.

A still further object of the invention is to provide articulators satisfying modern standards of scientific recognition which, at the same time, are sufficiently simple as to readily lend themselves to manufacture at no excessive cost, and to a facile and economic operation.

Other objects, and the manner in which the same are attained, will become apparent as this specification proceeds.

In the drawings accompanying this specification and forming part thereof, several embodiments of the invention are illustrated diagrammatically by way of example.

In the drawings,

Fig. 1 is a side view, in perspective, of one of the basic embodiments of the invention;

Fig. 2 and 3 are side views, partly in section, of modifications of a detail shown in Fig. 1;

Fig. 4 is a side view, in perspective, of another basic embodiment of the invention;

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Fig. 5 is a side view, partly in section, of a modification of a detail shown in Fig. 4;

Fig. 6 is a vertical section along line VI—VI of Fig. 7;

Fig. 7 is a plan view of a still further basic embodiment of the invention;

Fig. 8 is a top view of a guide member according to Figs. 6 and 7, drawn to a larger scale,

Fig. 9 is a section of the guide member of Fig. 8, and

Fig. 10, 11 and 12 are similar sections of modifications of such guide member.

Referring to the drawings wherein like elements are denoted by identical, but primed reference numerals, and first to the first basic embodiment of the invention illustrated in Fig. 1, on the stationary base plate 1, in proximity of its rear edge, are mounted two vertical supports 2 and 3 each of which, at its top, is provided with a pair of edges 4—5, and 6—7, respectively, the edges of each pair meeting at an angle of approximately 90°. The edges 4 and 6 slope downwardly in the direction toward the front of the base plate 1 at an angle of approximately 45° relative to this plate. A guide member 8 mounted in the middle of the front portion of plate 1 is formed with downwardly converging guide faces 9 and 10, arranged V-fashion, the line of intersection 11 of these guide faces lying in a plane parallel to the plane determined by the edges 4 and 6. A screw bolt 12, nuts 13 associated with this bolt, and a bore 14 and recesses 14a intended to receive a corresponding pin and corresponding lugs (not shown), respectively, all serve the purpose of mounting on the base plate 1, the lower portion of the artificial denture or denture model to be worked on in the articulator.

Two hinge pins 16 are mounted for rotation in tubular bearings arranged at the rear edge of a movable upper plate 15, longitudinal displacement of the pins 16 relative to the bearings being prevented by nuts 17. The ends 18 and 19 of the pins 16 are rigidly fixed to guide members 20 and 21, respectively. These substantially U-shaped guide members are in inverted position on the edges 4 and 5, and 6 and 7 of the supporting members 2 and 3, respectively. The guide member 20 is provided with four guide faces including a pair of outer guide faces 22 and 23, and a pair of inner guide faces 24 and 25. Similarly, the guide member 21 is provided with a pair of outer guide faces 26 and 27 and a pair of inner guide faces 28 and 29. The guide faces of any one pair converge and intersect in a straight line. Thus guide faces 22

and 23 have a line of intersection 30, guide faces 24 and 25 have a line of intersection 31, guide faces 26 and 27 intersect in the line 32, and guide faces 28 and 29 in the line 33. The lines of intersection 30 and 31, on the one hand, and the lines of intersection 32 and 33, on the other hand, are arranged at right angles relative to one another. These lines of intersection extend parallel to the edges on which they are supported in the position of rest of the device; thus, the line of intersection 30 extends parallel to the edge 5, line 31 extends parallel to edge 4, line 32 parallel to edge 7 and line 33 parallel to edge 6. The angle enclosed by the outer guide faces 22 and 23 should differ from that enclosed by the outer guide faces 26 and 27, for reasons which will become apparent as the specification proceeds.

The guide members 20 and 21 are connected to the stationary portion of the articulator by means of tension springs only one of which, spring 34, is shown in the drawing as connecting the guide member 20 with the supporting member 2 forming part of the stationary portion of the articulator. Under the influence of the spring 34 and its counter-part (not shown) on the other side of the articulator, and of the weight of the movable upper portion of the articulator, the guide members 20 and 21 are held down on the supporting members 2 and 3 in such a manner that the lines of intersection 30, 31, 32 and 33 abut against the corresponding edges 4, 5, 6, and 7, respectively. For the sake of clarity, Fig. 1 does not show this position of rest but shows a working position in which the guide members 20 and 21 are somewhat shifted to the rear so as to be spaced from the edges 5 and 7, respectively.

A lock screw 35 provided in the center of the front portion of the upper plate 15 permits to mount therein for vertical displacement, a somewhat pencil-shaped feeler member 36 the tapering end 37 of which is adapted to rest on the guide member 8.

A screw bolt 38 is mounted in the upper plate 15 and carries nuts and lock nuts (not shown in the drawing because they are hidden by the plate 15) corresponding to the nuts 13 provided on the bottom plate 1. This screw bolt and the nuts associated therewith as well as an aperture 39 adapted to receive a corresponding pin (not shown), are intended to support, underneath the plate 15, the upper portion of an artificial denture or a denture model to be worked on in the articulator.

In the operation of the articulator according to Fig. 1, the upper and lower portions of an artificial denture or a denture model are mounted on the upper plate 15 and the base plate 1, respectively so the upper and lower rows of teeth come to rest on one another the same as in the mouth. If it is remembered that it is the purpose of the articulator to cause the upper and lower portion of artificial dentures or denture models to perform the same movements relative to one another as they would when attached to the upper and lower jaws, respectively, during masticatory movements, it is apparent that a variety of movements can be imparted to the artificial dentures or denture models mounted in the articulator, as follows:

The sagittal movement is effected by forcing the upper plate 15 toward the rear in a direction perpendicular to the pins 16. During this movement, the guide members 20 and 21 slide along the edges 4 and 6, respectively, with their lines of intersection 31 and 33 retaining contact with these edges, and the point 37 of the feeler member 36 moves along the line of intersection 11 on the guide member 8. If the guide member 8 is provided so the line of intersection 11 extends parallel to the edges 4 and 6, the plates 1 and 15 remain parallel to one another during the movement just described, but the upper plate 15 moves both rearward and upward in accordance with the angle formed by the edges 4 and 6, as well as the line of intersection 11, with respect to the base plate 1. If it is desired, however, that in addition to moving rearwardly and upwardly the upper plate 15 should perform a pivotal movement with respect to the pins 16, the guide member 8 must be so formed so that the intersection line 11 extends not parallel, but at an angle to the edges 4 and 6. For example, if the intersection line 11 is more strongly inclined with respect to the base plate 1 than are the edges 4 and 6, the front of the upper plate 15 will rise when the plate 15 is moved toward the rear, i. e. looking at the plate 15 from the left in Fig. 1, it moves counter-clockwise with respect to the base plate 1. Thus it is seen that by providing a variety of guide members 8 formed with different angles of inclination of the line of intersection 11, a pivotal movement of the upper plate 15 can be initiated and controlled as to its direction and amount.

For lateral movements, pressure is exerted on one of the guide members 20 or 21 occupying their normal position, in the longitudinal direction of the pins 16. This causes not only a lateral movement of the upper plate 15 relative to the base plate 1, but also an upward movement of the upper plate 15 because of, and corresponding to, the inclination of the guide faces 24 and 25, and 28 and 29, as well as of the guide faces 9 and 10. If the angles formed between the guide faces 24 and 25, and 28 and 29, respectively, are the same as the angle formed between the lines of intersection of a vertical plane with the guide faces 9 and 10, the plates 1 and 15 remain parallel to one another even though the distance between them increases. If these angles, however, differ from one another, the upper plate 15 is subjected to a rotary displacement relative to base plate 1. The direction as well as the amount of this rotatory displacement can be predetermined by an appropriate choice of the respective angles. Simultaneously, however, the edges 5 and 7, bearing on one of the front guide surfaces 22 and 23, and 26 and 27, respectively, cause the upper plate 15 to shift rearwardly, this shift following a straight line if the angle formed by the faces 22 and 23 is the same as that formed by the faces 26 and 27. If, however, these angles differ from one another, the rearward movement is accompanied by a rotatory displacement of plate 15 around a vertical axis. Thus, a proper choice of the angles formed by the several guide faces renders possible a helical movement of the upper plate 15, in addition to the lateral and vertical displacements thereof.

In order to obtain diagonal movements, the upper plate is displaced either by a rearward movement of only one of the guide members 20 and 21, or by moving one of these members further to the rear than the other. If, for example, the guide member 20 only is moved to the rear, this member is caused to rotate about a center the location of which varies dependent on the point of contact between guide member 21 and supporting member 3. The lines of inter-

section 31 and 33 are subject to a rotatory displacement relative to the edges 4 and 6, respectively, with the result that the upper plate 15 executes an upward movement, a pivotal movement about the shafts 16, and a rotatory displacement about the point of contact of the guide member 21 and the supporting member 3, all at the same time.

Still another type of movement results if the edges 4 and 6, instead of being in a straight line as shown in Fig. 1, are provided arcuated or curved and the lines of intersection 31 and 33 are correspondingly shaped. Two such modifications are illustrated in Figs. 2 and 3 wherein parts 2' and 2'', respectively, replace the upper portion of the supporting member 2 of Fig. 1, and guide members 20' and 20'', respectively, replace the guide member 20 of Fig. 1.

In a further modification of the embodiment of the invention according to Fig. 1 the edges 4 and 6 extend at angles relative to the base plate 1 which are greater or smaller than 45° in accordance with variations to be found in human jaw joints, and means may be provided for adjusting these angles.

Referring now to the second basic embodiment of the invention illustrated in Fig. 4, this is similar in many respects to the embodiment shown in Fig. 1 in that it includes a stationary base plate 1' which, in proximity of its rear edge, mounts two vertical supporting members 2' and 3' each of which, at its top, is provided with a pair of edges 4' and 5', and 6' and 7', the edges of each pair being arranged perpendicular to one another. The edges 4' and 6' slant downwardly toward the front of the base plate 1' at an angle of approximately 45° relative to this plate. The front portion of the plate 1', in its center, mounts a guide member 8' which has guide faces 9' and 10' slanted in the manner of the opposite sides of a V, the line of intersection 11' of these guide faces lying in a plane parallel to the plane determined by the edges 4' and 5', and 6' and 7' respectively. A screw bolt 12', nuts 13' associated with this bolt, and a bore 14' and recesses 14a' intended to receive a corresponding pin and corresponding lugs (not shown), respectively, serve the purpose of mounting on the base plate 1', the lower portion of the artificial denture or denture model to be worked on in the articulator.

A movable upper plate 15', at its rear edge, carries a shaft 48 which in turn mounts, at its two ends, the guide members 40 and 41. Each of these guide members has two truncated cone-shaped portions 42 and 43, and 44 and 45, respectively, the two portions of each guide member being joined at their narrower top portions so circular lines of intersection 46 and 47, respectively, result which in the position of rest of the articulator, rest on the edges 4' and 6', respectively, and also abut against the other pair of edges 5' and 7', respectively. For the sake of clarity, Fig. 4 shows the guide members 40 and 41 spaced from the edges 5' and 7' but it is apparent that in the rest position of the articulator, the spring 34' tending to force guide member 40 down on the top of the supporting member 2' (and its counterpart, not shown, forcing guide member 41 down on the top of supporting member 3') cause the lines of intersection 46 and 47 to rest on edges 5' and 7', respectively, as well as on the edges 4' and 6', respectively.

The angles of the surfaces of the four truncated cone portions may all be equal, as shown in Fig. 4, or else may all be different from one another, or may be equal only for each pair, dependent on the type of movements the articulator shall be capable of.

A lock screw 35' provided in the front part of the upper plate 15' permits to adjustably mount therein for vertical displacement, the pencil-shaped feeler member 36' the tapering end 37' of which rests on the guide member 8'.

A screw bolt 38' mounted in the upper plate 15' carries nuts and lock nuts (not shown in the drawing because they are hidden by the plate 15') corresponding to the nuts 13' on the bottom plate 1'. This screw bolt and the nuts associated therewith, as well as an aperture 39' adapted to receive a corresponding pin (not shown), are intended to support, underneath the plate 15', as the upper portion of an artificial denture or denture model to be worked on in the articulator.

In the operation of the articulator according to Fig. 4, the upper and lower portions of an artificial denture or a denture model are mounted on the upper plate 15' and the base plate 1', respectively, so the upper and lower rows of teeth come to rest on one another the same as in the mouth. The particulator of Fig. 4 thus prepared, may perform a variety of movements, as folows:

The sagittal movement is effected by pushing the upper plate 15' toward the rear, at right angles to the shaft 48. During this movement the lines of intersection 46 and 47 remain on the edges 4' and 6' whereas the point 37' at the end of feeler member 36' moves along the line of intersection 11'. If the guide member 8' is provided so the intersection line 11' extends parallel to the edges 4' and 6', the plates 1' and 15' remain parallel to one another but the upper plate 15' is displaced rearwardly and upwardly in accordance with the angles of inclination of the intersection line 11' and the edges 4' and 6', respectively. If it is desired that in addition to the rearward and upward motions, the upper plate 15' also rotate about the shaft 48, the guide member 8' must be provided so that the line of intersection 11' is not parallel to the edges 4' and 6', respectively. For example, if the intersection line 11 is more inclined with respect to the base plate 1' than are the edges 4' and 6', the front of the upper plate 15' rises when the plate is moved to the rear, i. e. looking at the plate 15' from the left in Fig. 4, it moves counterclockwise relative to the base plate 1'. The direction and amount of this pivotal movement may be varied by using a variety of guide members 8' wherein the intersection line 11' is inclined at various different angles.

The transverse movement is effected by exerting pressure in the direction of the axle 48, on one of the guide members 40 and 41. This causes not only a lateral movement of the plate 15' relative to the base plate 1', but also an upward movement of the upper plate corresponding to the angles of the truncated cone portions and the inclination of the guide faces 9' and 10'. If the angles formed by the conical surfaces of the truncated cone portions of each guide member equal the angle formed by the line of intersection of a vertical plane with the guide faces 9' and 10', the plates 1' and 15' remain parallel and only the distance therebetween increases. If however, even only a part of these angles differ from the rest, the plate 15' is pivotally displaced with respect to the base plate 1'. Direction and amount of this pivotal displacement

may be predetermined by an appropriate choice of the various angles. Simultaneously, however, the edges 5' and 7' bearing on the truncated cone-shaped guide members 40 and 41, cause the upper plate 15' to shift to the rear, this shift being linear when the opening angles of the surfaces of the corresponding truncated cone portions of guide members 40 and 41 are equal. If, however, these angles are made to differ from one another, the upper plate 15' is caused to undergo a rotary displacement about a vertical axis. Thus it is apparent that if the various angles are appropriately chosen, the upper plate 15' may be moved not only upward or sideways, but moreover helically.

In order to obtain diagonal movements of the upper plate 15', one of the guide members 40 or 41 only is pushed to the rear, or else both guide members are moved but over different distances. If, for example, the guide member 40 only is moved to the rear, this guide member rotates about a center the location of which varies dependent on the point of contact of guide member 41 with the support 3'. The lines of intersection 46 and 47 are subject to rotatory displacement relative to edges 4' and 6', with the result that the upper plate 15' simultaneously rises, pivots about a horizontal axis, and turns about a vertical axis.

Still another type of movement results if the edges 4' and 6' are curved or arcuated instead of straight. This modification is shown in Fig. 5 wherein the top of a support 2'''' includes edges 4'' and 5'' which, together, have about the shape of an S-curve, i. e. a shape approaching that of the human condyloid cavity.

The embodiment of the invention according to Fig. 4 may be modified further by making the angle formed by the edges 4' and 6' relative to the base plate 1', greater or smaller than 45° corresponding to variations in the human jaw joints, and means may be provided for making this angle adjustable in accordance with prevailing requirements.

Referring now to the third basic embodiment of the invention illustrated in Figs. 6 to 12, incl., this includes a stationary base plate 50 which rests on annular flanges 51 arranged in the form of a triangle at the bottom of the base and provided with shoes 52 of rubber or the like material. The base plate 50, in proximity of its rear edge, mounts two vertical supporting members 53 and 54 each of which, at its top, is provided with a pair of V-shaped edges 55 and 56, and 57 and 58, respectively, the edges of each pair being arranged perpendicular to one another. The edges 55 and 57 slant toward the front of the base 50 at an angle of approximately 35°. The front portion of the base 50, in its center, mounts a guide member 59 having a flange 60 which surrounds, at the top and on the sides, a concave guide face 61. This guide face, on each side, extends into contact with one of two planes which intersect at an angle of about 150°, their line of intersection being disposed in a plane parallel to the planes formed by the edges 55 and 56, and 57 and 58, respectively.

The screw 62 with its head 63 and the nut 64, provided in the base plate 50, serves the purpose of mounting the lower portion of an artificial denture or denture model, as does the somewhat triangular projection 65 which is adapted to engage a correspondingly shaped recess at the bottom of the denture or model to fix the portion of the same relative to the base plate 50.

Shanks 66 provided to the rear of an upper, movable plate 67 serve as bearings for two bolts 68 which terminate in heads 69 and screw-threaded portions 70, respectively. The parts 70 are screwed into a lateral projection provided on the V-shaped guide supports 71 so as to be firmly connected therewith. These guide supports mount for replacement, guide members 72; these guide members have screw-threaded bores 73 which are engaged by screws 74 having heads 75 and extending through center bores in the guide supports 71.

The guide members 72 which are shown on a larger scale in Figs. 8 and 9, abut against the edges 55 and 56, and 57 and 58, respectively, on the supporting members 53 and 54. Each guide member includes two guide faces, namely one guide face 76 extending forwardly and downwardly and abutting, for most conditions of operation, against the edges 56 and 58, respectively, and another guide face 77 extending rearward and downward and resting on the edges 55 and 57, respectively. These guiding faces are cylindrical and concave, and each of them extends into contact with a pair of planes intersecting at angles *a* (Fig. 8) or *b* (Fig. 9), respectively, these angles exceeding 140°. Each has a curvature which diminishes from the base out (i. e. a radius of curvature which increases from the base outwardly). In the embodiment of the invention exemplified by Figs. 8 and 9, each of the two guide faces 76 and 77 is composed of two plane portions and a cylindrical, concave transition portion 78 and 79 which tangentially merges with the plane portions. The transition portions 78 and 79 may have a constant radius of curvature. The genetrices of the guide faces 76 and 77 form with one another, the same angles as the correlated pair of edges, this angle being 90° in the embodiment illustrated. The pairs of edges 55 and 56, and 57 and 58, respectively, are situated in parallel planes, and the genetrices of the guide faces of one guide member are also parallel to the corresponding genetrices of the guide faces of the other guide member. The angle *a* does not have to be the same as the angle *b*.

Pins 80 and 81 mounted at the bottom of one of the lateral projections on the guide supports 71, and on one of the supporting members 53 and 54, respectively, support pull springs 82; these springs, as well as the weight of the movable parts of the articulator, in the position of rest illustrated in Figs. 6 and 7, cause the guide members 72, with the bases of their guide faces 76 and 77, to be forced against the edges 55, 56, 57 and 58, respectively.

The front portion of the movable upper plate 67 has a vertical bore 83 which mounts for vertical displacement, a pencil-shaped feeler member 84 which over a part of its length is flattened as indicated at 85. A set screw 86 having a head 87 serves the purpose of fixing the position of the member 84 in the bore. The point 88 is conical and with its rounded tip, rests on the guide face 61.

The upper plate 67 has a triangularly shaped projecting portion 89 corresponding to portion 65 on the base plate 50 which, together with the screw 90 having a head 91 and a nut 92, serves to mount the upper portion of an artificial denture or denture model.

In the operation of the articulator according to Fig. 6, the upper and lower portions of an artificial denture or denture model are mounted on the upper plate 67 and the base plate 50, respec-

tively, so the upper and lower rows of teeth come to rest on one another in their normal position. Thus prepared, the articulator of Fig. 6 is capable of the following movements:

The sagittal movement is effected by pushing the upper plate 67 towards the rear, at right angles to the shafts 68. The bases 79 of the two guide members 72 remain on the edges 55 and 57 during the entire movement, whereas the feeler member 84 moves with its point 88 along the base of the guide face 61. If this guide face is shaped so that its base, which is formed by a narrow curved transition plane between two laterally and longitudinally inclined plane portions, extends parallel to the planes defined by the pairs of edges 55 and 56, and 57 and 58, respectively, the two plates 50 and 67 also remain parallel to one another, the upper plate 67 being displaced towards the rear and upwardly corresponding to the angle of inclination of the base of the guide face 61 and the similar angle of the edges 55 and 57. If it is desired that the upper plate 67 also rotate about the shafts 68, the guide face 61 may be shaped so its base does not extend parallel to the edges 55 and 57. For example, if the angle of inclination of this base exceeds that of the edges 55 and 57, the front portion of the upper plate 67 rises on the latter being moved to the rear, whereby the upper plate is turned counter-clockwise relative to the base plate. The guide member 59 may be arranged for replacement on the base plate 50 so that, by a suitable selection of any one of a variety of guide members, the amount and direction of this turning movement may be predetermined. If desired, the guide member 59 might also be arranged to pivot about an axis extending parallel to the shafts 68 so the inclination of the guide face on guide member 59 could be adjusted in accordance with prevailing requirements.

The transverse movement is indicated by exerting pressure in the direction of the bolts 68, on one of the guide members 72. This causes the upper plate 67 to be laterally displaced relative to the base plate 50, while simultaneously increasing its distance from the base plate 50 corresponding to the angles b of the guide faces 77 and the angle of inclination of the guide face 61. If these angles are equal, the plates 50 and 67 remain parallel so only the distance therebetween increases. If, however, there is any difference between any of these angles, the plate 67 is pivotally displaced with respect to the base plate 50. Direction and amount of this pivotal displacement may be predetermined by an appropriate choice of the various angles. Simultaneously, however, the edges 56 and 58 which bear on the guide faces 76, cause a shift of the upper plate to the rear, this shift being linear if the angles a for the guide faces 76 of the two guide members are equal. If, however, these angles are made to differ from one another, the upper plate is caused to undergo, in addition to the movement already described, a rotary displacement about a vertical axis. Thus it is apparent that provided the various angles are chosen appropriately, the upper plate may be moved not only upward or sideways, but moreover helically.

In addition, the articulator according to Fig. 6 is capable of performing diagonal movements which are initiated by moving only one of the guide members 72 to the rear, or moving both guide members to the rear but one over a greater distance than the other.

If, for example, only the lower guide member in Fig. 7 is moved to the rear, this guide member rotates about a center the location of which varies dependent on the point of contact of the other guide member 72 with the support 54. The transition planes 79 of the two guide members are subject to rotary displacement relative to edges 55 and 57, with the result that the upper plate 67 simultaneously rises, pivots about a horizontal axis and turns about a vertical axis.

The embodiment of the invention illustrated in Figs. 6 to 12 differs from the embodiments illustrated in the preceding figures in that the guide faces are not formed merely by two intersecting plane portions, but that even in the simplest case, a curved transition face is provided between two plane portions. The particular utility of this feature will be apparent to persons skilled in the art. Manifestly, this feature is responsible for yielding, on the artificial dentures or denture models, masticatory surfaces the section of which is no longer jagged but is more or less sinus-shaped. Evidently, this serves to further increase the "capacity of movement" or mobility, i. e. the sum total of all possible movements of the lower jaw on a free course of articulation. It should be noted that the formation of the guide face 77 is of somewhat greater importance than that of the guide face 76, and that in most cases the curved transition portion 78 extends over a very narrow part of the guide member only.

Figs. 10, 11 and 12 illustrate various guide members which may be substituted for the guide member 72 shown in Figs. 6 to 9, inclusive. The various guide members shown in these figures, in particular, show variants of the very important guide face 77 all of which are cylindrical and concave, extend into contact with a pair of planes intersecting at an angle exceeding 120° and over at least the greater part of their width have a curvature which diminishes from the base out. Thus, Fig. 10 shows a guide member 93 the guide face on which, in section, has hyperbolic shape. This guide face is symmetric relative to a plane the same as guide face 77 referred to above. It is completely curved and on its lateral edges extends into contact with a pair of planes which intersect at an angle c which exceeds 120°.

According to Fig. 11, the guide face 96 of the guide member 95 corresponds to the parabolic segment, the symmetry referred to above with reference to guide face 94, however, being no longer maintained. The guide face 96 with its sides, extends into contact with two planes which intersect at an angle d which again exceeds 120°.

According to Fig. 12, the guide member 97 has a guide face 98 the section of which represents a line which is not readily determinable mathematically. However, it answers the requirements enumerated above insofar as the radius of curvature increases from the base out to both sides into proximity of two lateral flanges 99 where the tangents intersect at an angle e exceeding 120°, the transition portion 100, of course, having a very small radius of curvature.

For certain applications of the articulator according to Fig. 6, the guide face 61 loses in importance so the feeler member 84 may be dispensed with. In this case, the guide support 59 and that portion of the plate 67 mounting the feeler member 84, also may be dispensed with, it being noted, however, that these modifications result in substantially reducing the variety of

applications of which the articulator otherwise is capable.

I wish it to be understood that I do not desire to be limited to the exact details of construction, design and operation shown and described, as numerous modifications well within the scope of the appended claims and not involving any departure from the spirit of the invention nor any sacrifice of the advantages thereof, may be apparent to persons skilled in the art.

I claim:

1. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges associated with said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including four guide faces, associated with said movable member, the guide faces of each guide member being arranged in pairs, each of said pairs being adapted to be supported by one of said guiding edges, the guide faces of each pair being disposed V-fashion and intersecting in a straight line, the lines of intersection of two adjacent pairs of guide faces intersecting in a point.

2. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges associated with said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including four guide faces, associated with said movable member, the guide faces of each member being arranged in pairs, each of said pairs being arranged to be supported by one of said guiding edges, the guide faces of each pair being disposed V-fashion and intersecting in a straight line, the lines of intersection of two adjacent pairs of guide faces being arranged perpendicular to one another and intersecting in a point.

3. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges on said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including four guide faces, associated with said movable member, the guide faces of each guide member being arranged in pairs, each of said pairs being adapted to be supported by one of said guiding edges, the guide faces of each pair being disposed V-fashion and intersecting in a straight line, the lines of intersection of two adjacent pairs of guide faces intersecting in a point, each one of said guiding edges extending along an arc which is concentric relative to the intersection line of the pair of guide faces correlated with said guiding edge.

4. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges associated with said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including four guide faces, associated with said movable member, the guide faces of each guide member being arranged in pairs, each of said pairs being adapted to be supported by one of said guiding edges, the guide faces of each pair being disposed V-fashion, said movable supporting member being mounted for rotary displacement, on said guide members.

5. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges associated with said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including two truncated cone-shaped guide faces, associated with said movable member, each pair of edges controlling the position of one of said guide members whereby to influence the relative displacement of said supporting members, the opening angles of the two truncated cone portions which form part of the same guide member being equal.

6. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges on said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including two truncated cone-shaped guide faces, associated with said movable member, each pair of edges controlling the positions of one of said guide members whereby to influence the relative displacement of said supporting members, the opening angles of the two truncated cone portions which form part of the same guide member being different from one another.

7. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges associated with said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including two truncated cone-shaped guide faces, associated with said movable member, each pair of edges controlling the position of one of said guide members whereby to influence the relative displacement of said supporting members, the opening angles of the two truncated cone portions which form part of the same guide member being equal, the angles between the cones of one guide member, however, being different from the angles between the cones of the other guide member.

8. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges on said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including two truncated cone-shaped guide faces, associated with said movable member, each pair of edges controlling the position of one of said guide members whereby to influence the relative displacement of said supporting members, all the opening angles of the four truncated cone portions which form part of the two guide members, being different from one another.

9. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two S-shaped guiding edges each comprising portions disposed substantially perpendicular to one another, associated with said stationary member, two guide members each having at least two guide faces, associated with said movable supporting member and arranged for displacement with respect to said guiding edges whereby to control the relative displacement of said supporting members.

10. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two S-shaped guiding edges each comprising portions disposed substantially perpendicular to one another, associated with said stationary member, two guide members each including two truncated cone-shaped guide faces, associated with said movable supporting member and arranged for displacement with respect to

said guiding edges whereby to control the relative displacement of said supporting members.

11. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges on said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including two guide faces, associated with said movable member, each pair of guiding edges controlling the position of one of said guide faces whereby to influence the relative displacement of said supporting members, each guide face being cylindrical and concave, extending into contact with a pair of planes intersecting at an angle exceeding 120°, and for at least the greater part of its width, having a curvature decreasing from the base on.

12. A dental articulator comprising in combination, a stationary supporting member, a movable supporting member, two pairs of guiding edges associated with said stationary member and having the edges of each pair arranged at an angle to one another, two guide members each including two guide faces, associated with said movable member, each pair of guiding edges controlling the position of one of said guide faces whereby to influence the relative displacement of said supporting members, each guide face being cylindrical and concave, extending into contact with a pair of planes intersecting at an angle exceeding 120°, and for at least the greater part of its width, having a curvature decreasing from the base on, at least one of the guide faces on each guide member being formed by two plane portions with a cylindrically curved transition portion arranged therebetween.

13. A dental articulator comprising in combination, a stationary support member, two substantially vertical supports associated with said stationary support and arranged in spaced juxtaposition, said two vertical supports having a pair of downwardly converging edges formed on top of each support, a pair of guide members formed with faces extending at an angle to each other riding on the said edges of each of said two supports, a movable support member hingedly supported in substantially horizontal position by and between said guide members, a third guide member arranged below said movable support member and associated with said stationary support member, said third guide member being formed with a pair of downwardly converging faces, and a feeler member susppended from said support member above said third guide member.

14. The device of claim 13, in which the faces of the guide members riding on the support edges diverge downwardly.

15. The device of claim 13, in which the faces of the guide members riding on the support edges are coaxial conical faces sloping towards each other.

16. The device of claim 13, in which the guide members riding on the supports extend into hinge sleeves formed on the feeler carrier.

17. The device of claim 13, in which the guide members riding on the supports are mounted on pins extending sideways from the feeler carrier.

18. The device of claim 13, in which each one of the guide members designed to ride on the top edges of the supports is formed with a pair of outer and a pair of inner guide faces, the guide faces of any one pair converging and intersecting in a straight line and their lines of intersection extending at an angle near 90° relative to each other.

19. The device of claim 13, in which the two guide members designed to ride on the guide edges of the supports are formed with a pair of outer and a pair of inner guide faces, the angle enclosed by the outer faces of one guide member differing from the angle enclosed by the outer faces of the other guide member of the pair.

20. The device of claim 13, in which the guide edges on the tops of the supports are curved.

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