May 19, 1942. D. NEUSTADT 2,283,385

DENTAL ARTICULATOR

Filed Jan. 18, 1941 2 Sheets-Sheet 1

Fig. 1

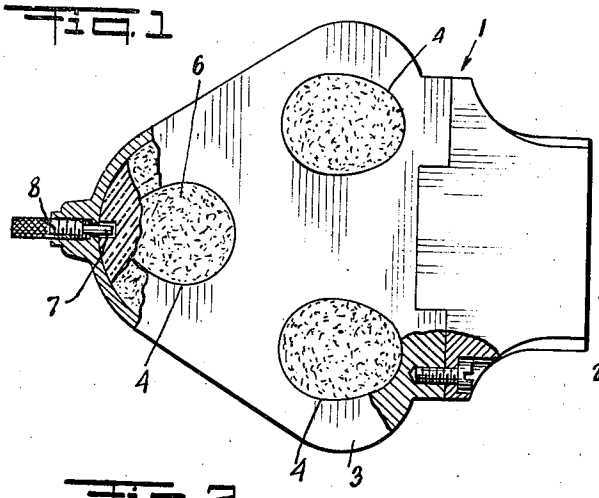


Fig. 5

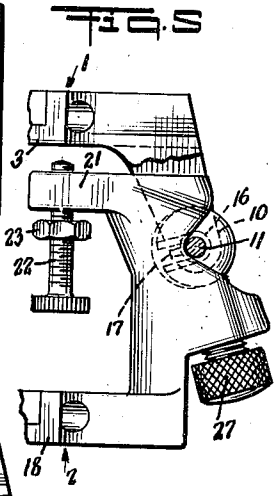


Fig. 2

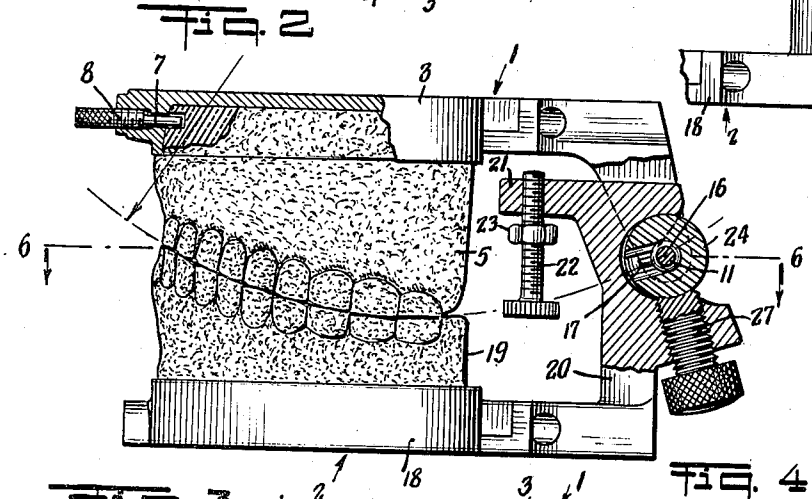


Fig. 3

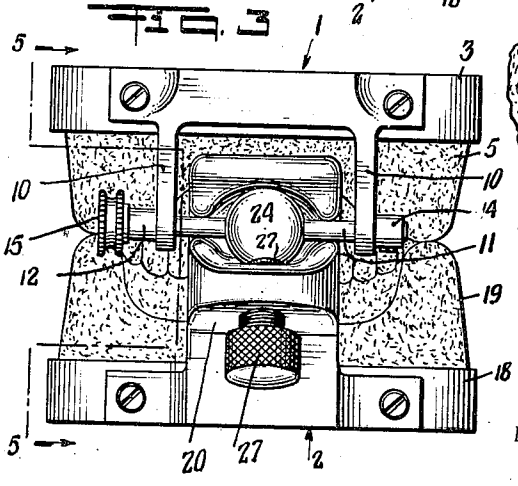
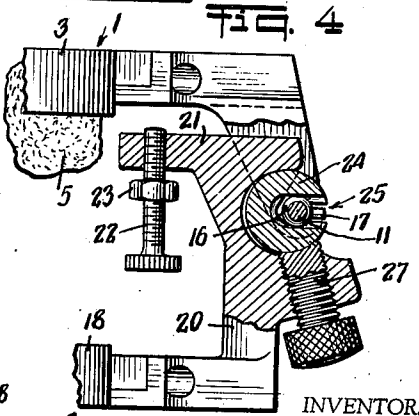


Fig. 4



INVENTOR.

David Neustadt

BY Mocks Blum

ATTORNEYS

May 19, 1942. D. NEUSTADT 2,283,385

DENTAL ARTICULATOR

Filed Jan. 18, 1941 2 Sheets-Sheet 2

Fig. 5

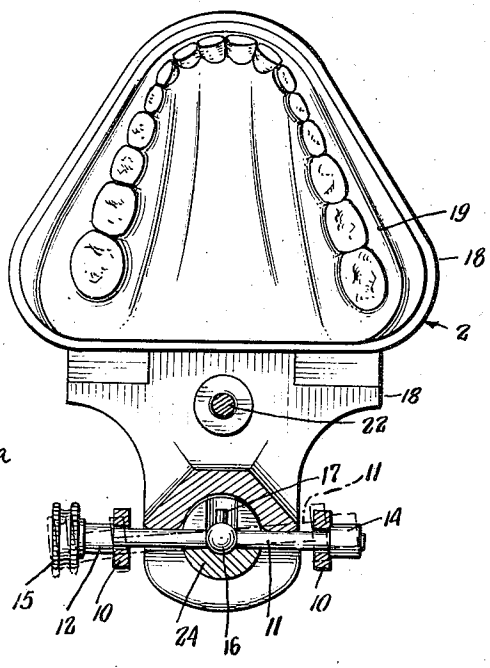


Fig. 5A

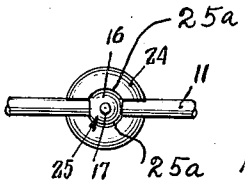


Fig. 7

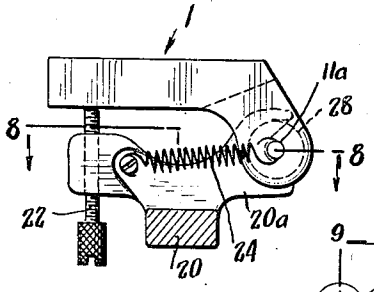


Fig. 8

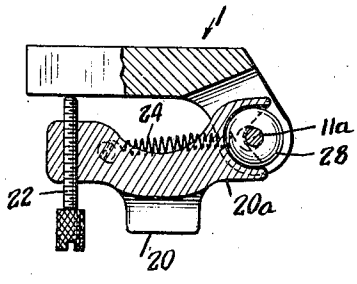
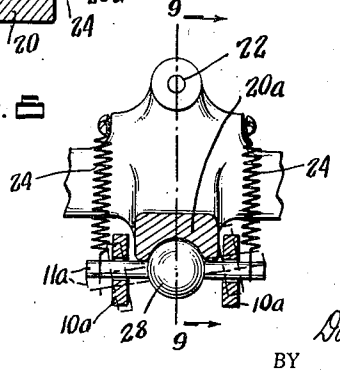


Fig. 6



INVENTOR.

BY David Neustadt
Mocks Blum

ATTORNEYS

Patented May 19, 1942 2,283,385

UNITED STATES PATENT OFFICE

2,283,385

DENTAL ARTICULATOR

David Neustadt, New York, N. Y., assignor to Columbia Dentoform Corp., New York, N. Y., a corporation of New York

Application January 18, 1941, Serial No. 374,955

3 Claims. (Cl. 32—32)

My invention relates to a new and useful dental articulator.

One of the objects of the invention is to provide an improved articulator for use in making partial dentures.

Another object of the invention is to provide an articulator which will have the same movements as the condyles of the lower jaw, including the up-and-down movement, the lateral movement, and the protrusive movement.

Another object of the invention is to provide an articulator for use in making a partial denture, in which the artificial teeth which are supplied to replace the missing teeth, will have the desired functional articulation.

Another object of the invention is to provide an articulator which has improved means for detachably holding the models of the proposed dentures.

Another and very important object of the invention is to provide an articulator in which the members of the articulator have the same relative movements as the jaws, said members being guided in said movements by the models of the proposed dentures.

Other objects of the invention will be set forth in the following description and drawings which illustrate preferred embodiments thereof.

Fig. 1 is a top plan view of the improved device, made according to the first embodiment.

Fig. 2 is a side elevation, a portion of the representation of the upper member having been broken away, in order to show the interior construction thereof.

Fig. 3 is a rear end elevation, taken at the right-hand end of Fig. 1. In this view, the joint is adjusted to permit only the up-and-down movement of the lower member relative to the upper member.

Fig. 4 is a detail view of the joint of the device, when this joint is adjusted for the lateral and protrusive movements, as well as the up-and-down movement.

Fig. 5 is an elevation on the line 5—5 of Fig. 3.

Fig. 6 is an elevation, partially in section, on the line 6—6 of Fig. 2.

Fig. 6A is an end view of the ball-shaped socket member of the lower member of the device.

Fig. 7 is an elevation of a modified joint.

Fig. 8 is a sectional view on the line 8—8 of Fig. 7.

Fig. 9 is a sectional view on the line 9—9 of Fig. 8.

In making a denture, especially a partial denture in which the mouth has some of its natural teeth, it is necessary to make allowance for the lateral and protrusive movements of the lower jaw of the patient, relative to the upper jaw. If this is not done, the denture is unsatisfactory, because the natural teeth grind into the denture. This seriously weakens the natural teeth.

Due to the extra difficulty and expense, the models of the upper and lower jaw of the patient, including the models of natural teeth and of the proposed denture or dentures, have often been tested only in an articulator whose joint permitted only an up-and-down movement. If the models were tested in an articulator whose joint simulated the lateral movement of the patient's lower jaw, said joint was made by special and expensive methods to follow the lateral movements of the patient's jaw, but these lateral movements were determined by the construction of the joint, and not by the models themselves.

Likewise, it was necessary to ship the articulator, with the models therein, from the dental laboratory, to the dentist.

According to my invention, the movements of the jaw members of the articulator are guided wholly by the models which are held in said jaw members. The models are readily detachable from the members of the articulator, and said articulator can be made in a standard size or sizes, so that it is not necessary to ship the models while they are assembled with the articulator.

The articulator comprises an upper member 1, and a lower member 2. The upper member 1 has a cup-shaped casing portion 3, which is provided in its top wall with a series of openings 4. The model 5 of the upper jaw has its upper portion fitting snugly but removably in this cup-shaped casing portion 3. This model 5 is provided with bosses 6, which fit removably in the bores or openings 4. These bosses 6 thus prevent any shifting of the model 5 relative to the cup-shaped casing 3. This model is made of any suitable material, which may be plaster of Paris or other moldable material, or said model may be a replica of the original plaster of Paris model or the like. This replica can be made of any heat-resistant investing material.

As shown in Fig. 2, the model 5 is provided at its front with a locking recess, in which the shank 7 of a locking pin can enter. This pin is provided with an outer thread 8, which engages the corresponding tapped bore in the front wall of the cup-shaped casing 3.

The model 5 is thus held firmly and removably in position.

At its rear end, the upper member 1 is provided with integral depending lugs 10. These lugs are provided with bores in which the pivot pin 11 is turnably mounted. This pivot pin 11 has an enlarged boss 12 at one end thereof. The collar 14 is removably connected by a set screw or the like, to the respective end of the pivot pin 11, so that the pivot pin 11 cannot shift laterally relative to lugs 10. This pivot pin 11 is provided with a knurled operating head 15.

Intermediate the lugs 10, the pivot pin 11 is provided with a ball-member 16, which has an integral radial pin 17. This member 16 may be of partial spherical shape. In the specific embodiment shown, its shape corresponds to a sphere whose ends have been cut off along two spaced planes which are perpendicular to the axis of the pin 11.

The lower member 2 is provided with a cup-shaped casing portion 18 which is similar to the cup-shaped portion 3. The model 19 of the lower jaw restoration, is held removably in this cup-shaped member 18. The bottom wall of the cup-shaped member 18 is provided with openings which are similar to the openings 4, and the bottom model 19 has bosses which are similar to the bosses 6. The lower casing 18 may also have a locking pin, like the pin 7.

The rear end of the lower member 2 is provided with an upstanding post 20. This post 20 is provided with a forwardly-projecting longitudinal arm 21. A vertical stop screw 22 is held adjustably in a corresponding tapped bore of the longitudinal arm 21, and this screw 22 can be held in its adjusted position, by a lock nut 23. The arm 20 is provided with a socket of partial spherical shape, in which a recessed socket ball 24 is turnable in all directions. As shown in Fig. 4, this recessed ball 24 is provided with a radial recess 25.

As shown in Fig. 6A, the walls of this radial recess 25 are provided with concave grooves 25*a*, so that the ball-member 16 can be radially inserted into this radial recess 25. The walls of this recess are planar, save for the concave grooves 25*a*. The ball-member 16 fits into and between these grooves 25*a*. Hence the ball-member 16 cannot move laterally in said recess, but said ball-member 16 can move forwards and backwards in said recess 25, relative to the inner wall of said recess 25. The pin 11 fits fairly closely between the planar walls of said recess so that the pin 11 can move forwards and backwards in unison with ball-member 16 and said pin 11 can turn around its own axis, but it cannot tilt perpendicular to its axis.

The post 20 is provided with an inclined tapped bore, in which the shank of the clamping screw 27 is mounted. After the ball 16 has been radially inserted into the recess 25, the pin 11 can be turned in unison with the ball-member 16 until the pin 17 of the ball-member 16 is in the position illustrated in Figs. 2 and 5. The screw 27 can then be tightened, so as to clamp the ball 24 in its socket.

The member 1 can then be freely raised and lowered, and the top of the adjustable screw 22 acts as a stop.

When the pin 17 is in the position shown in Figs. 2 and 5, the jaw members can only turn around a horizontal axis, thus providing for the relative up-and-down movement of the lower jaw relative to the upper jaw, but without any lateral or protrusive movements. This is designated as the centric movement of the model. Since the socket 24 is rigidly clamped in position, and since pin 11 fits snugly in the bores of lugs 10, the jaw members 1 and 2 cannot move longitudinally relative to each other. In such position the free end of pin 17 substantially abuts the wall of the recess in post 20, so that pin 11 cannot move longitudinally relative to ball 24.

In order to provide the lateral and protrusive movements, the set screw 27 is loosened and the pin 11 is turned in unison with the member 24, until the pin 17 is in the outward position shown in Fig. 4. The screw 27 is then tightened only slightly, so as to prevent the ball 24 from falling out of position. However, the ball 24 can turn freely in all directions relative to post 20, in a universal turning movement. In this position, the pin 11 can also move outwardly relative to the member 24, and said pin 11 can also turn freely about a vertical axis, in unison with the socket 24. The top of the screw 27 has a concave shape, in order to conform to the ball-shape of the member 24, and to permit the member 24 to turn freely relative to post 20 and screw 27.

In the second embodiment of Figs. 7–9, the pivot pin 11 is replaced by a pivot pin 11*a*, which has a ball 28 fixed thereto. This ball 28 fits partially into a corresponding partial spherical recess which is provided in the integral extension 20*a* of the post 20.

A pair of tension springs 24 are provided. Each tension spring has one end thereof connected to the post 20, and the other end thereof is connected to the respective end of the pivot pin 11*a*. These tension springs therefore maintain the ball 28 in yielding contact with its socket.

The jaw members can therefore be moved relative to each other about the horizontal axis and they can also be given the desired lateral and protrusive movements.

During the lateral and protrusive movements of the jaw members, the models 5 and 19 remain in free sliding contact throughout. The joint itself does not fix or determine these lateral and protrusive movements. Hence the laboratory technician or the dentist can study and perfect the models, under the same conditions as though they were dentures which had been installed in the mouth of the patient.

It is very simple to remove the models 5 and 19 and send them from the dental laboratory to the dentist, and the model of any denture will fit in any articulator, which is a great convenience.

The ball-member 16 is rigidly fixed to the pivot pin 11 in any suitable manner. The longitudinal axes of the grooves 25*a* are parallel to each other and perpendicular to the axes of the pin 11. The concave walls of these grooves 25 are equi-distant from the center of the ball-member 16. Save for the concave walls of the grooves 25*a*, the radial walls of the recess 25 are planar and parallel to each other, and the longitudinal axes of said planar walls are perpendicular to the axis of the pin 11.

For convenience, the device will be described and claimed with respect to the position illustrated in Fig. 2, in which the jaw members can move up and down, relative to each other, around a horizontal axis.

In the embodiments disclosed, the socket recess is provided in the lower jaw member, but it would not be departing from the invention if the parts of the joint were reversed in location or in function and such reversal is included in the claims.

If desired, the screw 27 can be loosened while

the parts of the joint are in the relative position shown in Fig. 2, so as to retain the member **24** movably in position. The jaw members can be moved relative to each other in substantial lateral and protrusive movements, without turning the member **24** to the position shown in Fig. 4. In each embodiment, one of the jaw members has a socket recess and the joint includes a ball-member which is located in said socket recess and which has a universal movement relative to the wall of said socket recess. This ball-member is the member **24** in the first embodiment, and it is the member **28** in the second embodiment. In both embodiments, the construction of the joint permits the upper jaw-member to move longitudinally and also laterally relative to the wall of said recess, while the parts of the joint are functionally assembled, so that the jaw members can move up and down relative to each other.

I have shown preferred embodiments of my invention, but it is clear that numerous changes and omissions can be made without departing from its spirit.

For example, instead of forming through-and-through perforations **4** in the end-wall of the respective cup-shaped recess, said end-wall may be recessed to receive the projection or projections **6**. The use of a plurality of projections **6** is preferred, in order to prevent the model from turning relative to its recess, but a single projection **6** is within the scope of the invention.

I claim:

1. A dental articulator comprising a lower-jaw member which has an upstanding projection, an upper-jaw member having depending means, said projection having a first cup-shaped recess, a first ball-member located in said recess and turnable in said first cup-shaped recess about a vertical axis and also about a horizontal axis, said upstanding projection having latch-means adapted to retain said first ball-member in said first cup-shaped recess, said first ball-member having a radial slot which has opposed walls and which is open at its outer end, a pivot-member connected to said depending means, said opposed walls having aligned radial supplemental recesses, said pivot-member having a supplemental ball-member which is located partially in said supplemental recesses, said pivot-member being located between said opposed walls, said upper-jaw member and said pivot-member and said supplemental ball-member being movable in unison longitudinally back-and-forth relative to said first ball-member, said supplemental ball-member being movable relative to the first ball-member around a horizontal axis and a vertical axis, the walls of said supplemental recesses holding said supplemental ball-member against substantial movement relative to the first ball-member in a direction parallel to the axis of said pivot-member.

2. A dental articulator comprising a lower-jaw member which has an upstanding projection, an upper-jaw member having depending means, said projection having a first cup-shaped recess, a first ball-member located in said recess and turnable in said first cup-shaped recess about a vertical axis and also about a horizontal axis, said upstanding projection having latch-means adapted to retain said first ball-member in said first cup-shaped recess, said first ball-member having a radial slot which has opposed walls and which is open at its outer end, a pivot-member connected to said depending means, said opposed walls having aligned radial supplemental recesses, said pivot-member having a supplemental ball-member which is located partially in said supplemental recesses, said pivot-member being located between said opposed walls, said upper-jaw member and said pivot-member and said supplemental ball-member being movable in unison longitudinally back-and-forth relative to said first ball-member, said supplemental ball-member being movable relative to the first ball-member around a horizontal axis and a vertical axis, the walls of said supplemental recesses holding said supplemental ball-member against substantial movement relative to the first ball-member in a direction parallel to the axis of said pivot-member, said supplemental ball-member having a radial pin.

3. A dental articulator comprising a lower-jaw member which has an upstanding projection, an upper-jaw member having depending means, said projection having a first cup-shaped recess, a first ball-member located in said recess and turnable in said first cup-shaped recess about a vertical axis and also about a horizontal axis, said upstanding projection having latch-means adapted to retain said first ball-member in said first cup-shaped recess, said first ball-member having a radial slot which has opposed walls and which is open at its outer end, a pivot-member connected to said depending means, said opposed walls having aligned radial supplemental recesses, said pivot-member having a supplemental ball-member which is located partially in said supplemental recesses, said pivot-member being located between said opposed walls, said upper-jaw member and said pivot-member and said supplemental ball-member being movable in unison longitudinally back-and-forth relative to said first ball-member, said supplemental ball-member being movable relative to the first ball-member around a horizontal axis and a vertical axis, the walls of said supplemental recesses holding said supplemental ball-member against substantial movement relative to the first ball-member in a direction parallel to the axis of said pivot-member, said supplemental ball-member having a radial pin, said radial pin being sufficiently long so that its tip substantially abuts the wall of said first cup-shaped recess when said pivot-member is turned so that said outer end faces the wall of said first cup-shaped recess.

DAVID NEUSTADT.