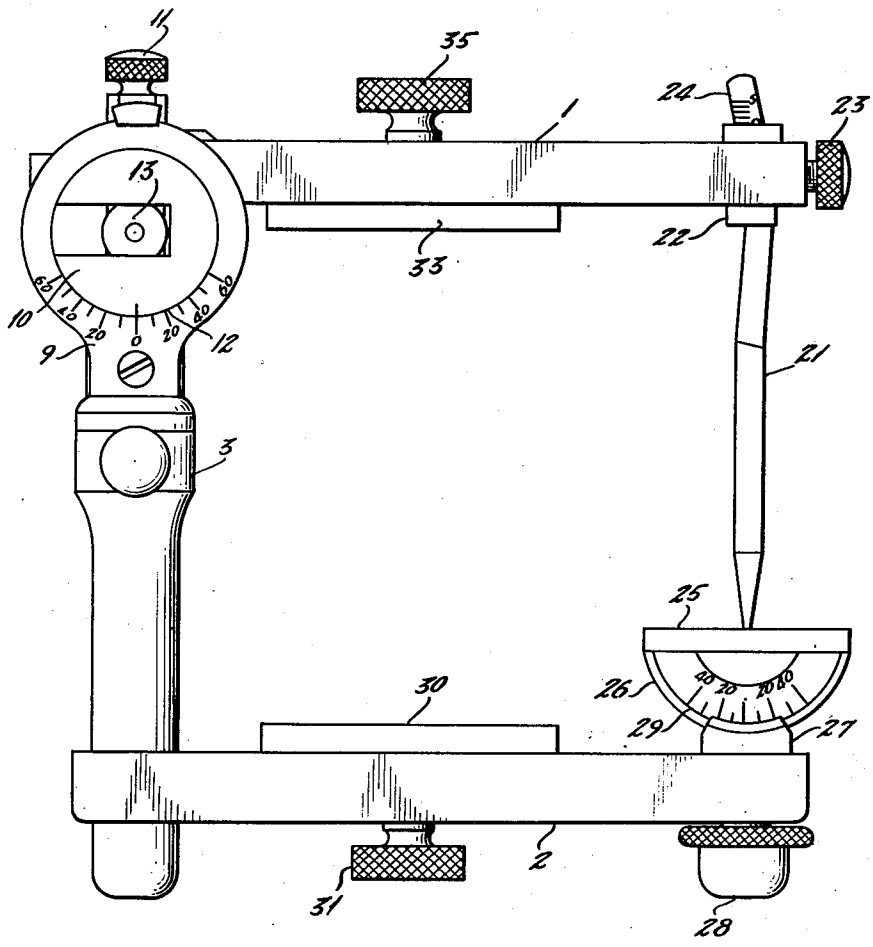
July 22, 1952 G. E. BJÖRKLUND 2,603,869

ARTICULATOR FOR ARTIFICIAL DENTURES

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Fig. 1.



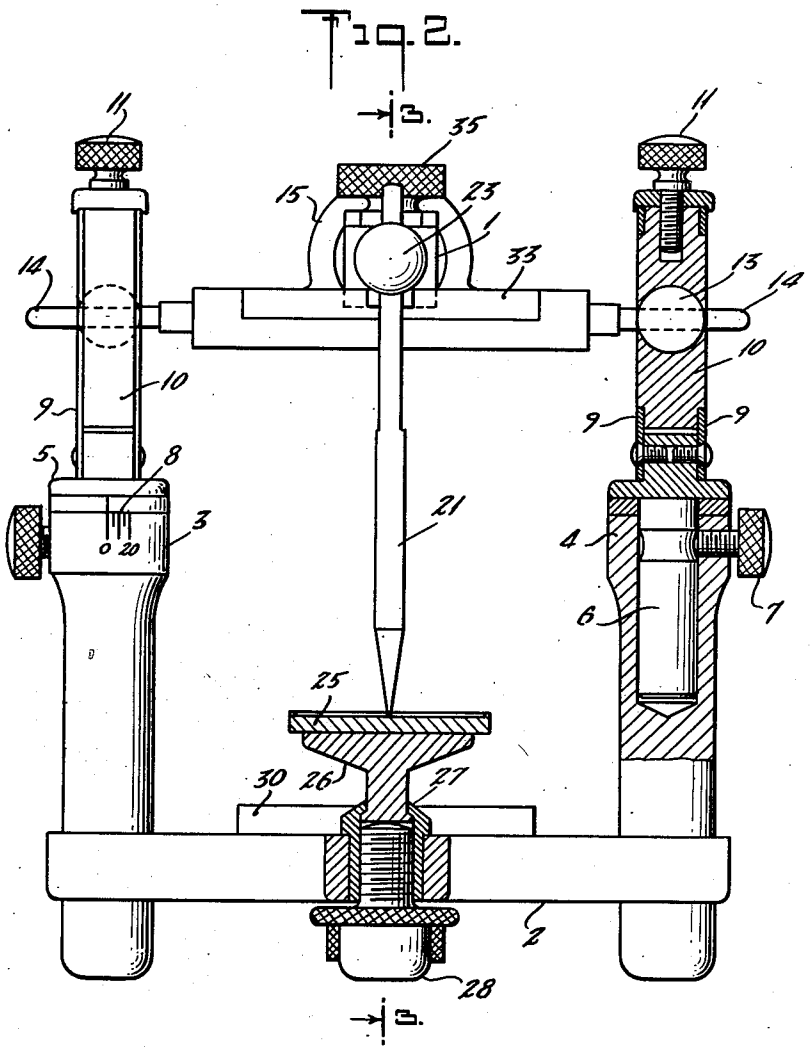
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ARTICULATOR FOR ARTIFICIAL DENTURES

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Fig. 2.



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Fig. 4.

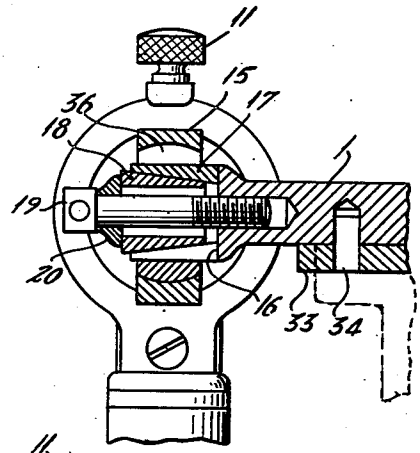
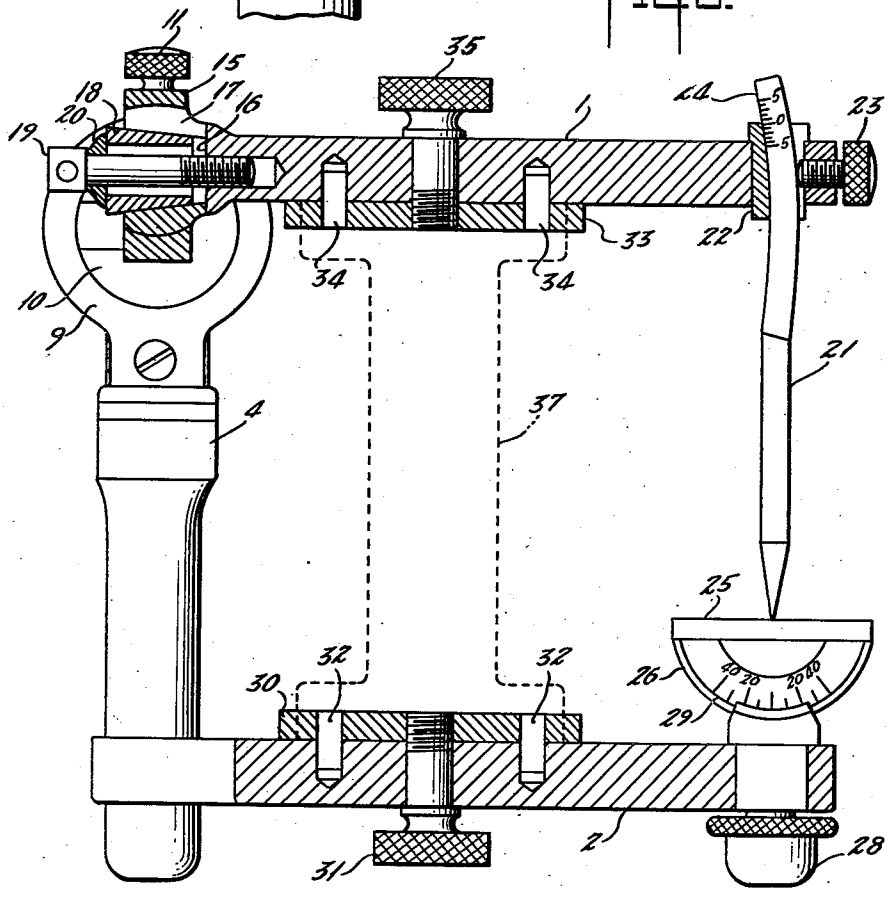


Fig. 3.



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ARTICULATOR FOR ARTIFICIAL DENTURES

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In Sweden March 5, 1945

7 Claims. (Cl. 32—32)

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In the manufacturing of artificial dentures so-called articulators are used in order to make possible an application of the teeth on the dentures whereby the chewing motion natural to the patient is attained. These articulators are principally composed of a lower part and an upper part which can be moved in relation to each other in about the same way as the lower jaw moves in relation to the upper jaw. When the articulator is used the position of the patient's chewing surfaces are localized in relation to the centre of motion of the jaw mechanism by means of certain measuring instruments. Thereafter with these measurements as a base models of the jaws are formed and put into the articulator, the upper jaw model being attached to the upper part and the lower jaw model to the lower part. The articulator is provided with such adjusting arrangements as to enable the surgeon to adjust the same in such a way that the models can carry out the same movements as the patient's jaws.

The manufacturing of the dentures in conformity to the models is thereafter not performed by the dentist but by a dental technician. In order to carry out his work in the right way the latter neets access to not only the models but also the articulator with the adjustments made by the dentist. As the technician may have his workship located at a place far away from the locality of the dentist's office it is not practical to send the whole articulator. Even if this could be done without inconvenience there is always the risk of the articulator being deformed or otherwise damaged during transportation so that the same adjustment does not correspond to the actual jaw motion. Because of this the technician should be provided with an articulator which coincides with the dentist's articulator so that the models may be moved from one articulator to the other without any divergences arising. However it has proved difficult to manufacture articulators with such close tolerances. Even if the articulators are exactly alike when new they may be altered little by little on account of careless usage or wear.

The present invention has for its purpose to remedy these drawbacks and consists in the articulator being provided with arrangements which make it possible for the dentist as well as the technician to control and adjust their articulators to such a coincidence that the models can be moved from one articulator to another without introducing errors and inaccuracies. According to the invention a firm but releasable coupling

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is inserted between the upper part of the articulator and the lower part in such a way that the position of the upper part can be adjusted in relation to the lower part. In order to ensure the right adjustment of the articulator the upper part and the lower part are locked in their correct relative positions by means of a gage fixture or the like.

In the following the invention will be further described with reference to the annexed drawings in which Fig. 1 shows an example of an articulator constructed according to the invention as seen from one side. Fig. 2 shows the same articulator as seen from the front. Fig. 3 shows a section of the articulator on the line 3—3 of Fig. 2 and Fig. 4 shows a section of a slightly modified form of the articulator coupling.

In the figures 1 indicates the upper part of the articulator and 2 the lower part. In the latter two holders 3 and 4 are fastened, which at the top carry the bearing supports for the upper part. In Fig. 2 the holder 4 is shown partially in section by means of which the construction will be made clear. The holders 3 and 4 consist of a fixed lower part in which an upper part 5 is pivotally arranged by means of a journal 6. The pivotal part can be adjusted and locked in any given position relative to the lower part through a locking screw 7, this position being indicated on a scale 8. In the upper holder part 5 two journal rings 9 are fixed which support a condyle slide 10 which can be turned in the journal rings and locked in a given position relative to these through a locking screw 11, which also acts as a handle, when the condyle slide is to be turned. The angular position of the condyle slide is indicated on a scale 12. In the condyle slide is a rectangular notch the upper and lower surfaces of which are provided with grooves thus forming a condyle track in which a bearing ball 13 travels.

The bearing balls 13 travelling in the condyle tracks of the holders 3 and 4 are provided with transverse bores and are able to slide and rotate freely on journal pins 14. These pins are coaxially fixed on an intermediate member 15, which also supports the upper part 1 of the articulator and is connected with the same through a firm but releasable coupling the construction of which will be more evident from an inspection of Fig. 3.

The upper part 1 is formed as an elongated beam the cross sectional area of which is somewhat increased at the rear end where the beam has a plane end surface 16 perpendicular to the longitudinal axis of the beam. On this surface

one end of a split ring 17 seats, the inner surface of which is conical and the outer spherical. The outer spherical surface of the ring 17 is received in a corresponding spherical recess in the intermediate member 15. The centre of this recess is located above the centre line of the journal pins 14. Inside the split ring 17 is disposed a ring 18 having an outer conical surface. By means of a screw 19 threaded in the upper part 1 and perpendicular to the end surface 16, and a washer 20 lying between the head of the screw and the larger end surface of the inner conical ring 18, the ring 18 can be pressed into the outer ring 17 toward the surface 16. Thereby the ring 17 will be expanded and firmly locked in the recess of the intermediate member 15 and at the same time be pressed against the plane end surface 16 of the upper part and locked to the same. In this way the upper part 1 may be locked to the intermediate member 15 by tightening the screw.

The internal diameter of the inner conical ring 18 is much larger than the diameter of the screw 19 and therefore a space is formed between these parts, which after the screw has been loosened allows a certain displacement of the upper part 1 in any desired direction in the plane of the surface 16 which is substantially parallel to the centre line of the journal pins 14. The screw 19 being loosened the upper part 1 may also be displaced perpendicularly to said plane i. e. in the direction of the length of the upper part by the intermediate member 15 being turned about the centre line of the journal pins 14 whereby the centre line of the spherical surface in the intermediate member travels in an arcuate path, the upper part 1 being also displaced a distance in the plane of the surface 16 corresponding to the upward or downward movement of the intermediate member 15. It will also be apparent that with the screw 19 loosened the upper part 1 may be turned about its own longitudinal axis which is perpendicular to the plane of the surface 16 and that a certain angular displacement of the surface 16 relative to the centre line of the journal pins 14 is possible because of the spherical surface of the recess in the intermediate member 15.

From what precedes it will be seen that the coupling formed by the conical rings 17 and 18 makes possible free movement within certain limits of the upper part 1 in relation to the intermediate member 15 and consequently in relation to the lower part 2.

In the fore end of the upper part 1 a pin 21 is journalled as a slide in a bushing 22. The pin may be fixed in a given position by means of a locking screw 23 and a scale 24 on the pin indicates its position. The upper part of the pin is bent to arcuate form, the centre of the arc lying on the centre line of the journal pins 14 by means of which the position of the pin can be altered without altering its location relative to the lower part 2. The lower tapered end of the pin 21 rests upon a plane surface 25 formed by a flat piece which is arranged on a semicircular plate 26. The arcuate periphery of the plate 26 is slidably journalled in a holder 27 in such way that the angle between the centre line of the pin 21 and the plane surface 25 may be altered by displacing the plate in the holder. The centre axis of the arcuate bearing surface lies in the plane 25 and is perpendicular to the plane of symmetry of the articulator so that the plate moves in this plane when being displaced. The holder 27 is firmly disposed in the lower part 2 and is provided with a locking screw 28 for the plate 26 which is equipped with a scale 29 on which the angular position of the plane surface 25 is indicated.

On the upper plane surface of the lower part 2 a lower model fastening means in the form of a plate 30 may be attached with a screw 31. The plate 30 is provided with locating pins 32 which engage in corresponding bores in the lower part 2. In the same way an upper model fastening means 33 with locating pins 34 may be arranged on the lower plane side of the upper part 1 and be fixed with an attaching screw 35.

If desired the construction of the articulator described above may be altered in different ways within the scope of the invention. Fig. 4 shows as an example a modified form of coupling. In this case the outer conical split ring 17 is provided with a cylindrical outer surface and is surrounded by a further split ring 36 the inner surface of which is cylindrical and outer surface spherical. The ring 36 is disposed with its spherical surface in the spherical recess of the intermediate member 15 the centre of the recess in this case being located on the centre line of the journal pins 14. The coupling of the latter modified form has substantially the same function as the coupling shown in Fig. 3. The displacement of the upper part perpendicularly to the plane 16 may however in this case be made by displacing the conical ring 17 axially in the ring 36.

The location and construction of the coupling may of course be varied in numerous other ways. It may thus be placed in the lower part or in the holders for the upper part or at the attaching screws for the model fastenings. The coupling may also be provided with separate adjusting and locking arrangements for displacement in different planes or directions of the upper and/or lower part.

Essentially the invention makes it possible to always obtain the same position of the upper part 1 with relation to the lower part 2 when all the adjusting arrangements of the articulator are properly set. In order to obtain an exact and unvarying adjustment of the articulator in this respect a gage fixture 37 (shown in Fig. 3 in dotted lines) may be employed. The fixture 37 is provided with plane end surfaces for contact with the upper and lower parts, guiding pins corresponding to the pins 32 and 34 in the model fastenings, and threads for the attaching screws 31 and 35. The fixture is so dimensioned that the mutual distance of the end surfaces and the position of the guiding pins exactly coincide with the desired distance between the upper and lower parts and the positions of the bores respectively when the articulator is normally set i. e. when the scales 8, 12, 24 and 29 are set at zero and both the balls 13 rest upon the bottoms of the rectangular notches of the condyle slides 10 as shown in Fig. 1.

When the articulator is to be adjusted it is first brought to the normal setting mentioned above and the model fastenings 30 and 33 are removed and the locking screw 19 of the coupling is loosened. The gage fixture 37 is thereafter attached to the upper and lower part by means of the screws 31 and 35, the upper part 1 due to the coupling being free to assume its proper position in relation to the lower part if the relative positions of these parts should for any reason have become incorrect. The screw

19 is thereafter tightened and the articulator is ready for use after the gage fixture 37 has been removed.

What I claim is:

1. In an articulator for artificial dentures, an upper part adapted to support an upper jaw model, a lower part adapted to support a lower jaw model, primary coupling means permitting controlled relative movements of said parts, adjusting means including scales arranged to set said coupling means for predetermined movements of the upper part in relation to the lower part during the use of the articulator, and a second adjusting means comprising a releasable universal coupling between the upper part and the lower part independent of said primary coupling means, said universal coupling when released permitting limited vertical, horizontal and axial movement of the upper part relative to the lower part and independent of the first adjusting means while maintaining the axes of said upper and lower parts substantially parallel, whereby to enable said parts to be brought into exact predetermined fixed position relative to each other for correcting any existing inaccuracies in the zeroing of said scales.

2. An articulator according to claim 1, characterized in that the upper part is releasably connected with a cross member journalled in holders carried by said lower part.

3. An articulator according to claim 2, characterized in that the releasable coupling is adapted to permit universal displacement of the upper part with respect to a plane parallel to the center line of the cross member and to permit the upper part to be turned about an axis perpendicular to said plane.

4. An articulator according to claim 3 in which the releasable coupling means is adapted to permit limited angular displacement of the adjusting plane relative to the center line of the cross member.

5. An articulator according to claim 2, characterized in that the secondary coupling means comprises an internally conical split ring arranged in a recess in the cross member, one end of said ring resting against a plane surface formed in the upper part, and an outwardly conical ring fitting in said first ring, the outwardly conical ring being displaceable in the direction of the plane surface by means of a screw threaded in the upper part to lock the split ring to the cross member and also to the upper part.

6. An articulator according to claim 5, characterized in that the split ring is provided with an outer spherical surface and a recess in the cross member has a corresponding spherical shape, the center of the spherical surface of the recess being located eccentrically in relation to the center line of the cross member whereby the displacement of the upper part perpendicular to the adjusting plane can be effected by turning the cross member about its journal and at the same time displacing the split ring on the plane surface of the upper part.

7. An articulator according to claim 6, characterized in that the split ring is provided with an outer cylindrical surface and that a further split ring, the inner surface of which is cylindrical and the outer surface of which is spherical, is arranged about the first mentioned ring and fits in the recess of the cross member which is provided with a corresponding spherical surface.

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