March 10, 1942. E. W. BURNS ET AL 2,275,726

ARTICULATOR BALANCER

Filed Jan. 30, 1941 3 Sheets-Sheet 1

Fig. 1.

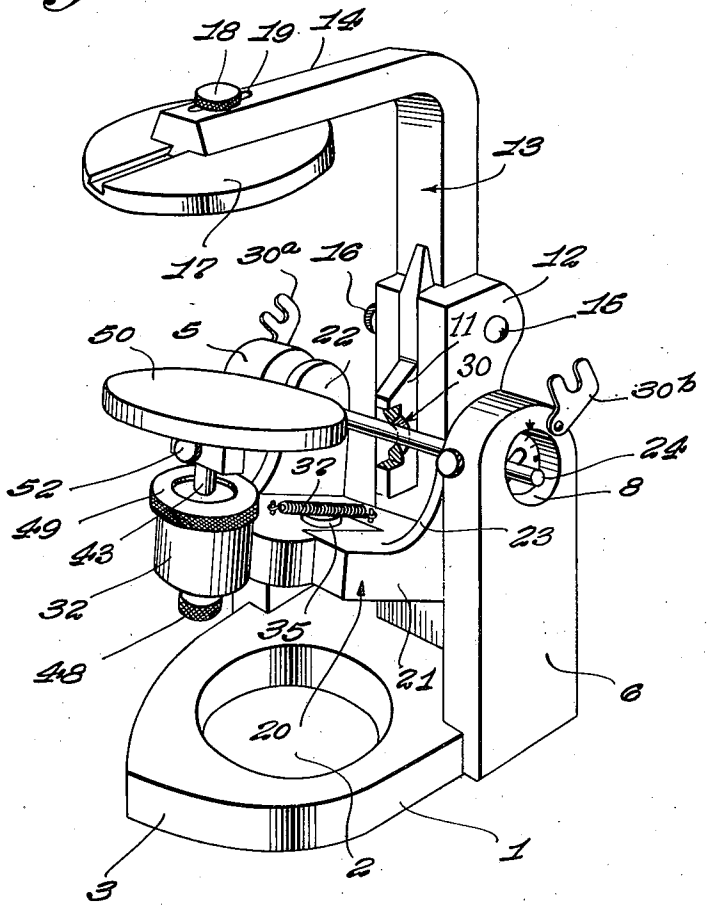
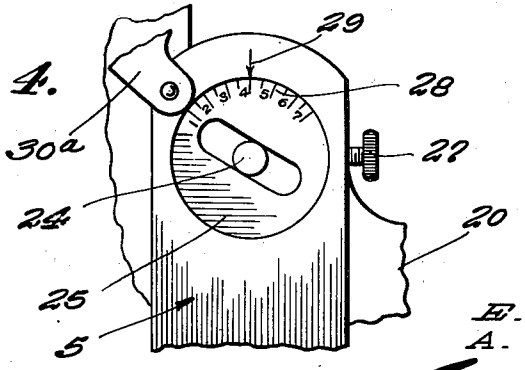


Fig. 4.



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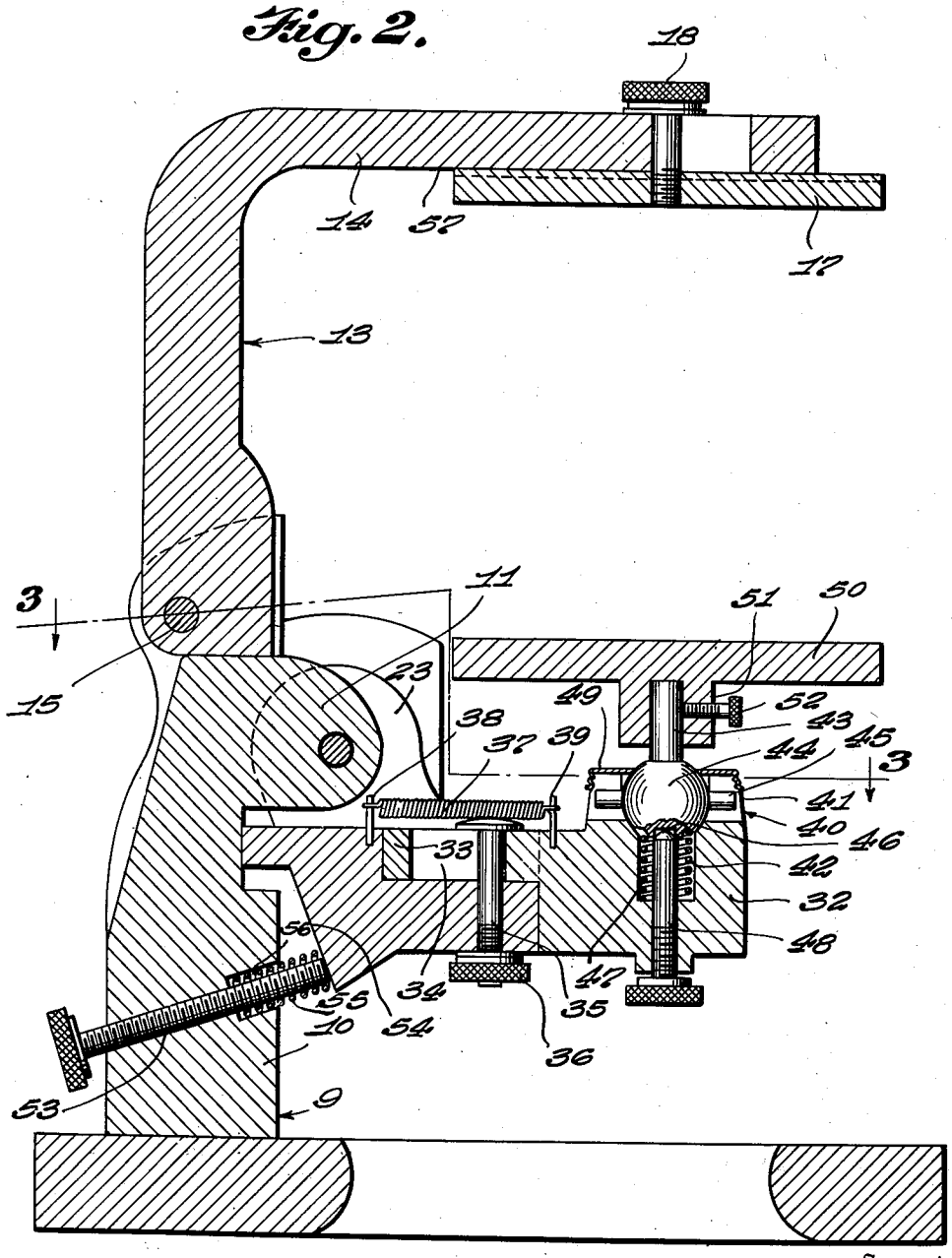
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ARTICULATOR BALANCER

Filed Jan. 30, 1941 3 Sheets-Sheet 2

Fig. 2.



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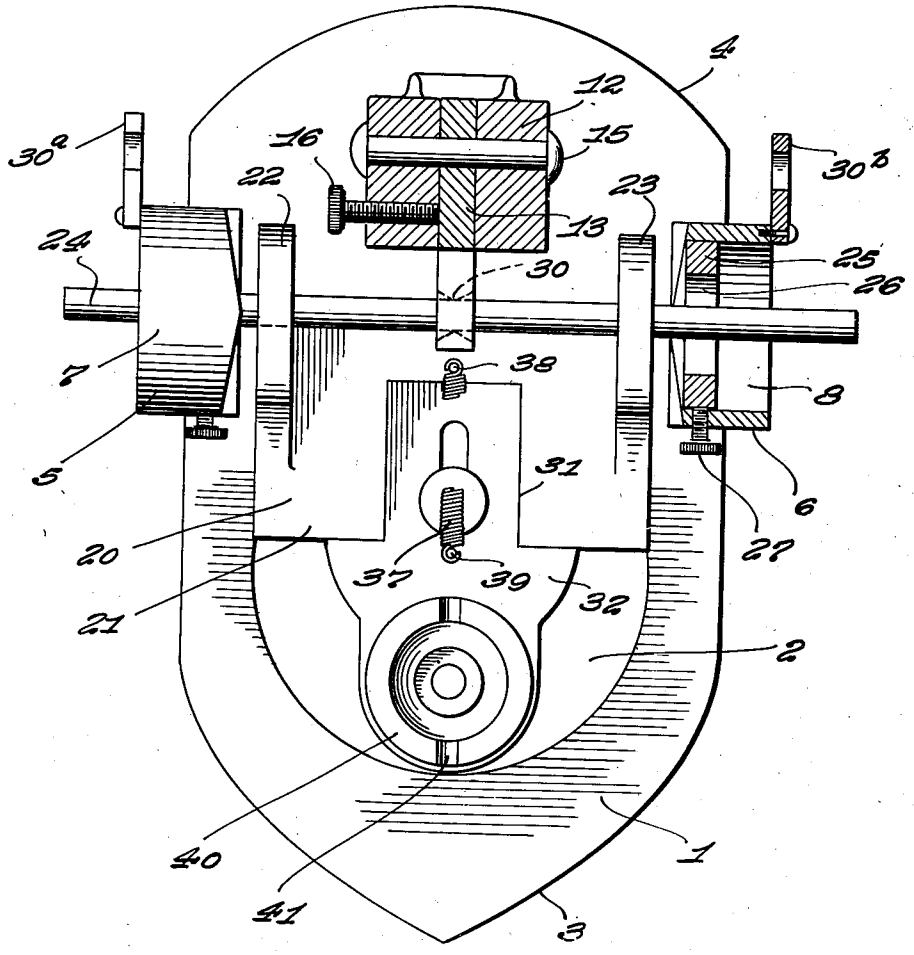
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ARTICULATOR BALANCER

Filed Jan. 30, 1941 3 Sheets-Sheet 3

Fig. 3.



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UNITED STATES PATENT OFFICE

2,275,726

ARTICULATOR BALANCER

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Application January 30, 1941, Serial No. 376,702

13 Claims. (Cl. 32—32)

This invention relates to articulators and more particularly to an improved articulator balancer for use in the manufacture of artificial dentures.

One object of the invention is to provide an articulator balancer which will be opertaive for maintaining plaster casts in their correct occlusal relationship during the operation of arranging artificial teeth.

Another object of the invention is to provide a device of this character wherein the mandible holder employed is so constructed and mounted that every movement of the lower jaw may be simulated.

Another object of the invention is to provide an articulator balancer employing means for retaining the mandle and the maxillary holders in adjusted position.

A further object of the invention is to provide, in an articulator balancer, means for mounting the maxillary holders in such a manner that it may be swung to a position for permitting convenient mounting of a cast thereon.

Still another object of the invention is to provide, in an articulator balancer, means for mounting the mandible holder in such a manner that lateral motion, including the "speeder's curve" will be permitted.

Still further objects of the invention, not particularly mentioned hereinbefore, will become apparent during the course of the following description.

In the drawings:

Figure 1 is a perspective view of our improved articulator balancer,

Figure 2 is a vertical sectional view, on an enlarged scale, of the device,

Figure 3 is a transverse sectional view on the line 3—3 of Figure 2, looking in the direction indicated by the arrows, and

Figure 4 is an enlarged detail elevation showing particularly the mounting of one end of the mandible holder supporting shaft.

Referring now more particularly to the drawings wherein, as will be seen, like numerals of reference designate like parts throughout the various views, the numeral 1 indicates in general the base of my improved articulator balancer. The base 1 is of substantially oblong shape and is formed of cast metal or other suitable material. The base 1 is formed with a relatively large circular opening 2 which extends throughout its forward end portion. As shown, the base is also formed with curved converging side walls 3 and a curved rear wall 4.

Rising from the base, near the corresponding rear ends of the side walls 3, are supporting arms 5 and 6, said supporting arms being formed with journal openings 7 and 8 at their corresponding upper ends. Also rising from the base, medially of the width thereof and near the rear wall 4, is a standard which is shown generally at 9.

It should be understood at this point that, in practice, the base 1, supporting arms 5 and 6 and the lower section of the standard 9 would preferably be cast as a single unit.

The lower section of the standard 9 is indicated at 10 and is formed with a forwardly projecting mounting lug 11, the purpose for which will be set forth presently. As clearly seen in Figures 1 and 3 of the drawings, the section 10 is bifurcated at its upper end to define a mounting yoke 12. Hingedly mounted in the yoke 12 is the lower end of a substantially inverted L shape maxillary holders supporting element 13, said element having a forwardly projecting arm 14 which overhangs the base 1. A pivot pin 15 extends through the yoke 12 and through the arm 13 for providing the hinge connection. A set screw 16 extends through one of the legs of the yoke and is engageable with the lower end of the element 13 for retaining said element in a desired adjusted position. Mounted on the arm 14 and engageable with the under surface thereof is a maxillary holders 17 which is of substantially elliptical shape. It should be understood, of course, that the maxillary holders may be shaped to suit particular conditions. The maxillary holders 17 is adjustably connected to the arm 14 by means of a screw 18, said screw extending through an adjusting slot 19 and into the body of the maxillary holders. It will now be understood that, by loosening the screw 18, the maxillary holders may be shifted to any desired position on the arm 14. After such position has been found, tightening of the screw will cause effective locking of the maxillary holders in position.

Associated with the base 1, the supporting arms 5 and 6 and the standard 9, is a mandible supporting frame 20. The mandible supporting frame includes a plate 21 from each side of which rise integral mounting lugs 22 and 23, which mounting lugs are apertured to receive a mounting shaft 24, said mounting shaft extending through the mounting lug 11, the said lugs 22 and 23 and into the journal openings 7 and 8. In order to mount the ends of the shaft for adjustable movement within the openings, we provide mounting disks 25, said mounting disks being formed with centrally disposed oblong slots 26. The disks are mounted in the openings 7

and 8 and are held in adjusted positions therein by means of set screws 27. By referring particularly to Figure 4, it will be seen that the disks 25 are graduated, at 28, to show various adjusted positions with respect to arrows 29 on the upper ends of the supporting arms. The opening in the lug 11 is tapered from its opposite sides towards its center to define a pivot 30 for the shaft 24. It will now be understood that the shaft 24 may be canted between the supporting arms 5 and 6 for disposing the frame 20 in the desired angular positions with respect to the base 1. In other words, by rotating one or both of the disks 25, the shaft 24 may be rocked on the pivot 30 for canting the frame 20.

When only direct opening and closing movements are desired, the shaft will be retained in axial position with respect to the disks by means of locking plates 30^a and 30^b which are hingedly mounted on the upper ends of the arms 5 and 6 respectively.

The frame 20 is, as best seen in Figure 3, formed with a cut away central portion or recess 31, said cut away central portion or recess 31 communicating with the forward edge of the frame and being of a depth equal to substantially one-half the thickness of said frame. Associated with the frame is a mandible supporting member or block 32, said block having a tongue 33 extending into the recess 31 and said tongue having a slot 34. Extending through the slot and through the frame is a connecting screw 35 on which is screwed an adjusting nut 36. It will be understood that the block 32 may be shifted with respect to the frame 20 but that said shifting movement will be limited by the action of the bolt 35 within the slot 34. A spring 37 is connected between a pin 38 on the frame and a pin 39 on the block and serves to urge the block toward its innermost position.

The block 32 is formed with an integral mounting sleeve 40, said mounting sleeve having diametrically disposed slots 41 and said sleeve communicating with a recess 42. Mounted in the sleeve is a mandible supporting stem 43 which has a ball member 44 at its lower end, said ball member having trunnions 45 which engage in the slots 41. At its lower side the ball member 44 is provided with a seat 46, said seat being presented to the recess 42. Carried in the recess is a coiled spring 47, said coiled spring surrounding the upper end of a threaded adjusting stem 48, said adjusting stem being screwed upwardly through the recess and having an upper end engageable in the seat 46. Closing the upper end of the sleeve 40 is a cap 49, said cap overlying the ball member 44 and retaining said ball member in place in the sleeve and in engagement with the upper end of the spring and the adjusting stem 48.

Mounted on the mandible supporting stem 43 is a mandible holder 50, said holder having an integral hub 51 which carries a set screw 52, the inner end of which is engageable with the stem 43 for maintaining the mandible holder in adjusted position.

In order to adjust the mandible assembly, I provide an adjusting bolt 53 which is screwed through the section 10 of the standard and into a position for engagement with the inclined rear face 54 of the frame 20. A spring 55 surrounds the bolt 53 and has its rear end portion seated in a recess 56.

The operation of our improved articulator balancer will, it is believed, be clearly understood by those skilled in the art but for sake of clearness a brief description follows. The casts are first placed upon the mandible and maxillary holders. The maxillary holder, as hereinbefore described, is hingedly mounted, by means of the element 13 in the yoke 12 so that it may be swung to a position for convenient mounting of the plaster cast. After the casts have been mounted on the maxillary and mandible holders and during arrangement of the teeth, the mandible holder may be rocked or canted to any desired position. This is true because of the hereinbefore described mounting of the mandible holder. More specifically, the stem 43, with the ball member 44 thereon, will permit rocking of the mandible holder from side to side and some forward and backward tilting thereof. The trunnions 45 will, however, prevent turning of the stem within the sleeve 40. The shaft 24 may be canted, by movement of the disks 25 for canting the frame 20 with respect to the maxillary holder. The mandible supporting frame and block may be shifted against the tension of the spring 55, it being understood that the bolt 53 has been retracted sufficiently to permit such downward movement. In this connection it is desired to state that the spring 55 will extend beyond the end of the bolt 53 and will normally urge the mandible assembly to a substantially horizontal position.

The block 32 may be drawn forwardly from the frame when desired. However, the spring 37 will urge the block rearwardly as soon as pressure thereon is released. The nut 36 may be tightened for adjusting the block with respect to the frame 20.

The nut 18 may be loosened for permitting longitudinal sliding movement of the maxillary holder on the arm 14, said arm being slotted for the purpose. The slot 19 will cooperate with a tongue, shown in dotted lines at 57, for preventing rotation of the maxillary holder.

It is desired to call attention to the fact that, inasmuch as the opening 2 has been provided in the base, convenient manual engagement with the lower end of the bolt 48 and the nut 36 may be had.

Attention is also directed to the fact that, in view of the particular mounting provided for the mandible holder, said holder may be employed to simulate every movement of the lower jaw. Moreover, inasmuch as we have provided the particular mounting shown for the shaft 24, lateral motion for the mandible holder will be made possible, said lateral motion including the "speeder's curve." By tightening the bolt 48, the mandible holder may be held rigidly in any adjusted position.

It is believed that further description of the invention is unnecessary.

Having thus described the invention, what is claimed as new is:

1. An articulator balancer including a base, a standard on the base having an opening therein, the walls of which are tapered inwardly to form a pivot, a maxillary holder pivotally mounted on the standard, supporting arms disposed on opposite sides of the standard, a horizontal mounting shaft having its intermediate portion extending through said opening and engaging the pivot and its opposite ends extending through said arms, a frame mounted on the shaft, a mandible supporting member slidably mounted on the frame, a mandible holder, a ball and socket connection between the mandible holder and said sliding

member, and means operatively connected with the sliding member for holding the same in retracted position.

2. An articulator balancer including a base, a standard on the base having an opening therein, the walls of which are tapered inwardly to form a pivot, a maxillary holder pivotally mounted on the standard, supporting arms disposed on opposite sides of the standard, a horizontal mounting shaft having its intermediate portion extending through said opening and engaging the pivot and its opposite ends extending through said arms, a frame mounted on the shaft, a block slidably mounted on the frame and provided with a threaded sleeve having a recess therein and communicating with the sleeve, a mandible holder, a ball member fitting within the sleeve and provided with a stem engaging the mandible holder, a cap threaded on the sleeve, and a spring seated in the recess and bearing against the ball member.

3. An articulator balancer including a base, a standard on the base having an opening therein, the walls of which are tapered inwardly to form a pivot, a maxillary holder pivotally mounted on the standard, supporting arms carried by the base, a horizontal mounting shaft having its intermediate portion extending through said opening and engaging the pivot and its opposite ends extending through said arms, a frame mounted on the shaft, a block slidably mounted on the frame and provided with a sleeve having a seat formed therein, a mandible holder, a ball member engaging the seat and having an upstanding stem secured to the mandible holder, an adjusting screw extending through the sliding block and engaging the ball member, means for securing the sliding block in adjusted position, and means extending through the standard and bearing against the frame for tilting said frame.

4. An articulator balancer including a base, a standard on the base, a maxillary holder pivotally mounted on the standard, supporting arms, a horizontal mounting shaft supported on the standard and extending through said arms, a frame mounted on the shaft, a block slidably mounted on the frame and having its inner end slotted, the outer end of said block being provided with a sleeve having spaced notches formed therein, a mandible holder, a ball member fitted within the sleeve and provided with trunnions adapted to engage said notches, said ball member being provided with a stem engaging said mandible holder, a spring carried by the sliding block and bearing against the ball member, an adjusting screw extending through the spring and engaging said ball member, a cap fitted over the sleeve, and a bolt extending through the slot in the block and engaging the frame for holding the block in adjusted position.

5. An articulator balancer including a base, a standard on the base, a maxillary holder pivotally mounted on the standard, supporting arms carried by the base, a horizontal mounting shaft supported on the standard and extending through said arms, a frame mounted on the shaft and having its rear end beveled, a block slidably mounted on said frame and provided with an upstanding sleeve having a concave seat and provided with spaced notches communicating with the seat, a mandible holder, a ball member engaging said seat and provided with oppositely disposed trunnions adapted to engage the adjacent notches, a cap fitting over the sleeve and bearing against the ball member, a stem projecting upwardly from the ball member and engaging the mandible holder, means for yieldably holding the ball member in engagement with the cap, means for holding the sliding block in adjusted position, an adjusting screw extending through the standard and bearing against the beveled end of the frame for tilting said frame, and a spring surrounding the adjusting screw and bearing against said beveled end.

6. An articulator balancer including a base, a standard on the base and provided with a mounting lug, a maxillary holder pivotally mounted on the standard, supporting arms having openings formed therein constituting bearings, a horizontal mounting shaft extending through the mounting lug and through the openings in the supporting arms, disks journaled in said bearings and provided with slots for the reception of the adjacent ends of the mounting shaft, a frame mounted on said shaft, a block slidably mounted on the frame and provided with a concave seat, a mandible holder, a ball element engaging said seat and provided with an upstanding stem secured to the mandible holder, means carried by the ball member and cooperating with the sliding block for preventing rotation of said ball member, a cap carried by the sliding block and fitting over the ball member, a spring for yieldably supporting the ball member in engagement with the cap, and means for tilting the frame, sliding block and mandible holder.

7. An articulator balancer including a base, a standard on the base provided with a mounting lug having an opening formed therein, the walls of which are beveled to form a pivot, a maxillary holder pivotally mounted on the standard, supporting arms disposed on opposite sides of the standard and having their upper ends provided with openings, a shaft extending through the opening in the bearing lug and having its intermediate portion resting on said pivot and its opposite ends extending through the openings in the supporting arms, slotted disks mounted for rotation in the openings of said supporting arms and through which slots the adjacent ends of the shaft extend, locking plates pivotally mounted on the arms and movable into engagement with the adjacent ends of the mounting shaft, means extending through the arms and engaging the disks for holding said disks in adjusted position, a frame mounted on the shaft and provided with a concave seat having a recess communicating therewith, said frame being provided with an upstanding sleeve formed with oppositely disposed notches, a mandible holder, a ball member fitted in said seat and provided with oppositely disposed trunnions for engagement with the notches, a stem projecting upwardly from the ball member and engaging the mandible holder, a spring fitted in said recess and bearing against the ball member at said seat, and means operatively connected with said frame for tilting the same with respect to the base.

8. An articulator balancer including a base, a standard secured to the base and having its upper end bifurcated and formed with a laterally projecting mounting lug, an angular arm pivotally mounted in the bifurcated end of the standard, a maxillary holder carried by the arm, said bearing lug being provided with a transverse opening having its walls tapered inwardly to form a pivot, upstanding arms disposed on opposite sides of the standard and provided with openings, a horizontal shaft having its intermediate portion ex-

tending through the mounting lug and engaging said pivot and its opposite ends extending through the openings in said arms, graduated disks journaled in said openings and provided with slotted portions through which the adjacent ends of the shaft extend, a frame having mounting lugs receiving said shaft and having its forward portion cut away to form a recess and its rear end beveled, a block slidably mounted on said frame and provided with a reduced slotted portion fitted in said recess, a bolt extending through said slotted portion and frame for securing the sliding block in adjusted position, said sliding block having its forward end provided with a concave seat and having an upstanding sleeve surrounding said seat and provided with spaced notches, a mandible holder, a ball member engaging said seat and provided with trunnions adapted to fit in said notches, said ball member being provided with an upstanding stem to which the mandible holder is secured, means engaging the beveled end of the frame for tilting said frame vertically, a cap fitted over the sleeve and bearing against the ball member, a spring normally engaging said ball member at said seat, and an adjusting screw extending through the sliding block and bearing against the ball member.

9. An articulator balancer including a base, a standard mounted on the base and having an opening therein, the walls of which are tapered inwardly to form a pivot, an angular arm pivotally connected with the standard, a maxillary holder carried by the angular arm, vertical arms extending upwardly from the base, a horizontal mounting shaft having its intermediate portion extending through said opening and engaging the pivot and its opposite ends extending through said arms, a frame carried by the shaft and tiltable vertically with respect to the base, a mandible holder, and a ball and socket connection between the mandible holder and said frame.

10. An articulator balancer including a base, a standard on the base having its upper end slotted and provided at said slotted portion with a forwardly projecting mounting lug having an opening therein, the walls of which are beveled in opposite directions to form a pivot, arms projecting upwardly from the base and provided with openings, disks mounted for rotation in openings in the arms and provided with slots, a mounting shaft having its intermediate portion extending through the opening in the mounting lug and engaging the pivot and its opposite ends projecting through the slots in the disk, a movable frame having means through which said mounting shaft extends, the forward end of the frame being provided with a recess, a block slidably mounted in said recess, a mandible holder, a ball and socket connection between the mandible holder and the adjacent end of said sliding block, means for preventing rotation of the ball member, a spring normally bearing against said ball member, pins carried by the frame and sliding block respectively, a spring connecting said pins, means for tilting the frame, and means for holding the sliding block in a selected position of adjustment.

11. An articulator including a base, a standard having an opening therein, the walls of which are inclined in opposite directions to form a pivot, a maxillary holder pivotally mounted on the standard, arms disposed adjacent the standard, a mounting shaft having its intermediate portion extending through the opening in the standard and bearing against the pivot and its opposite ends extending through the arms, a frame suspended from said shaft, a mandible holder carried by the frame and coacting with the maxillary holder, and means carried by the arms and coacting with the adjacent ends of the mounting shaft for canting said shaft on said pivot to tilt the mandible holder carrying frame with respect to the base.

12. An articulator including a base having an opening therein, a standard projecting above the base at the rear of said opening and provided with a mounting lug having an opening therein, the walls of which are inclined in opposite directions to form a pivot, an angular arm pivotally connected with the standard, a maxillary holder carried by the angular arm, vertical arms mounted on the base and offset with respect to said standard, the upper ends of said arms being provided with openings, a mounting shaft having its intermediate portion extended through the opening in the mounting lug and bearing against said pivot and its opposite ends extending through the openings in said vertical arms, a frame suspended from the mounting shaft, a mandible holder carried by the frame and coacting with the maxillary holder, and means disposed within the openings in the vertical arms and coacting with the adjacent ends of the mounting shaft for canting the mounting shaft on said pivot to tilt the mandible holder carrying frame with respect to the base.

13. An articulator balancer including a base, a standard mounted on the base and having an opening therein, the walls of which are tapered inwardly to form a pivot, an overhanging arm operatively connected with the standard, a maxillary holder carried by the arm, a horizontal mounting shaft having its intermediate portion extending through said opening and engaging the pivot to permit vertical tilting movement of said shaft with respect to the standard, a frame mounted on the shaft and tiltable vertically with respect to the base, a mandible holder, and a ball and socket connection between the mandible holder and said frame.

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