April 29, 1958 A. R. MOORE ET AL 2,832,137

MANDIBULAR CLAMP

Filed May 20, 1957 2 Sheets-Sheet 1

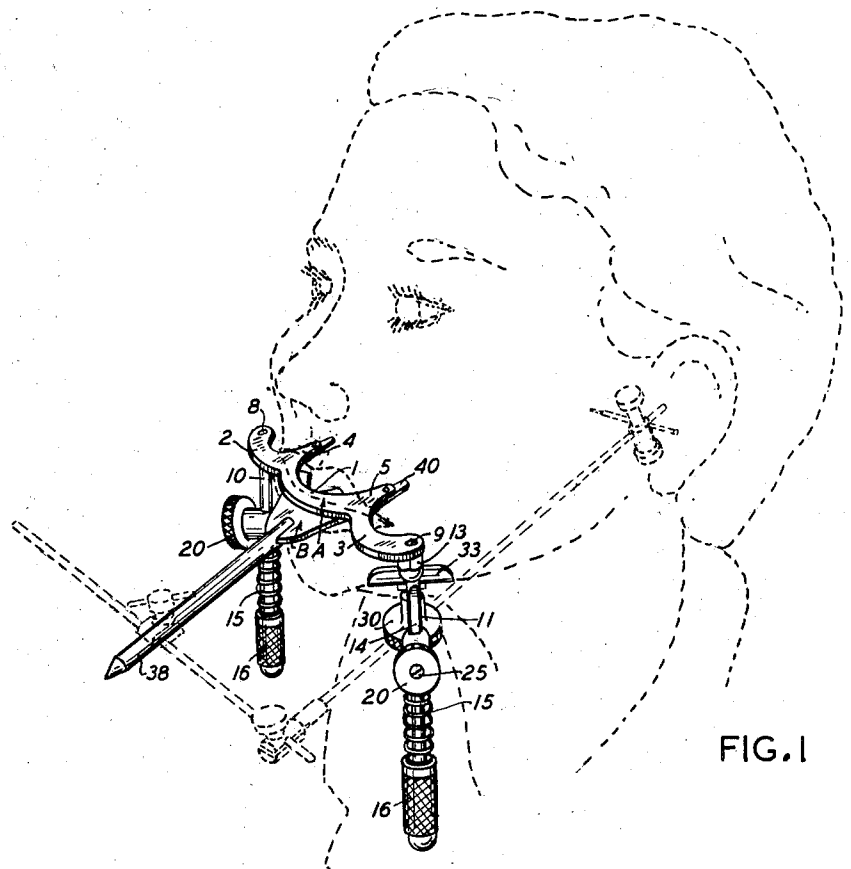


FIG. 1

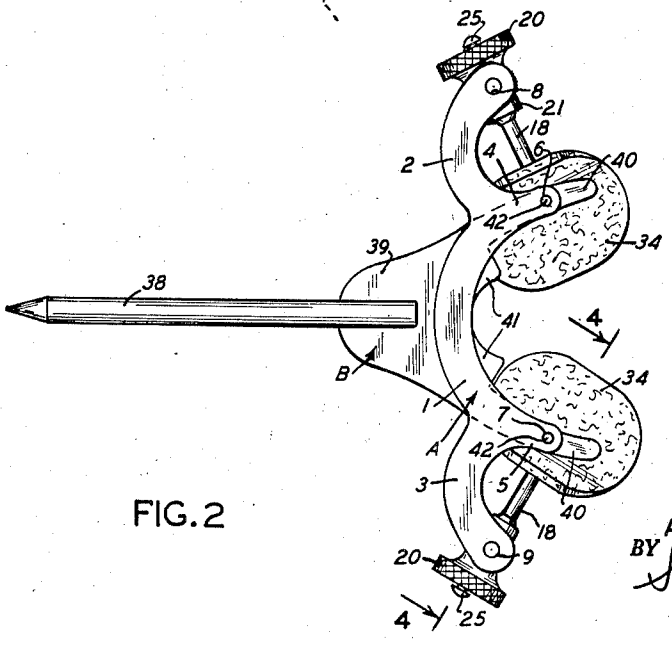


FIG. 2

INVENTORS
ALVIN R. MOORE
ARNE G. LAURITZEN
BY Samuel Jacobson
ATTORNEY

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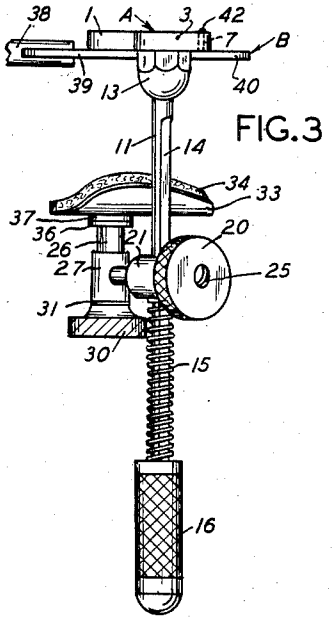


FIG. 3

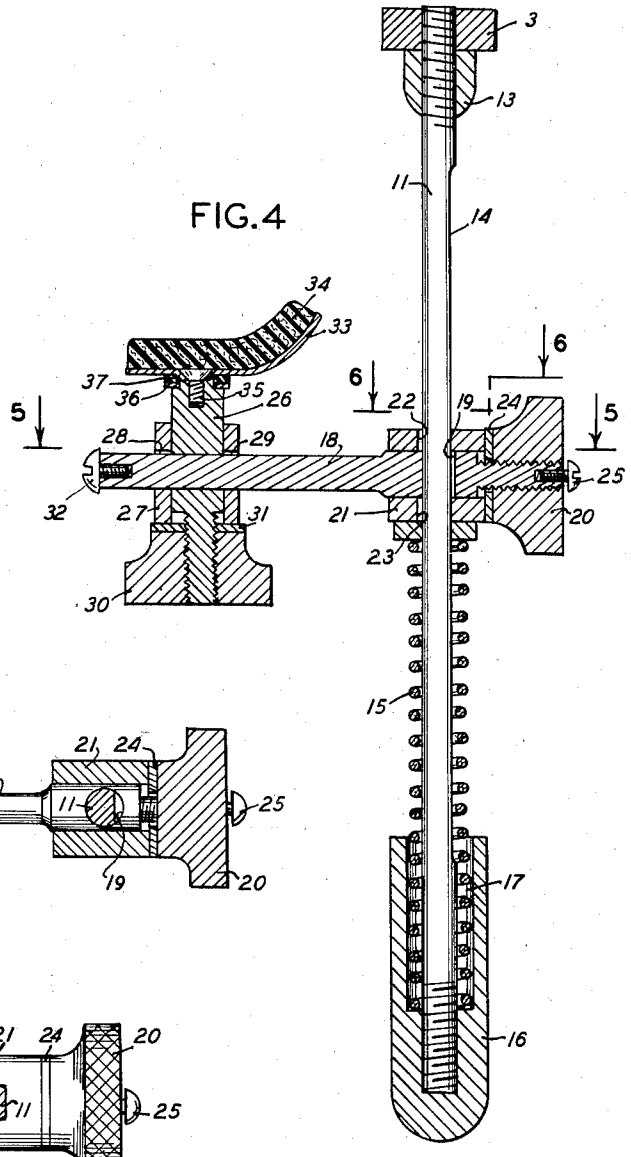


FIG. 4

FIG. 5

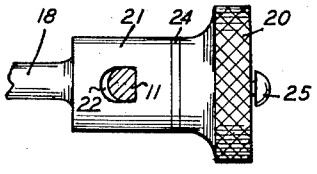


FIG. 6

INVENTORS
ALVIN R. MOORE
ARNE G. LAURITZEN
BY Samuel Jacobson
ATTORNEY

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MANDIBULAR CLAMP

Alvin R. Moore, Portland, Oreg., and Arne G. Lauritzen, Seattle, Wash.

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14 Claims. (Cl. 32—19)

In its broadest sense, our invention relates to the manufacture and repair of dental protheses and, where indicated, the determination of the bite deficiencies in a patient's natural dentures. The invention particularly relates to devices used in conjunction with and for rigidly supporting face bows and other types of locators of the temporo-mandibular joint of a patient. In its narrowest sense, the invention relates to a mandibular clamp used in conjunction with a hinge axis locator of the type illustrated in the drawings.

It is well-known that the occlusal plane of the natural human denture is anteroposteriorly parallel to the ear-nose plane which is the plane extending through the arcuate line between the ears from tragus to tragus via the line of transition between the upper lip and nose. When the natural denture is removed, it is necessary to locate the occlusal plane in the mouth of the patient in order to reproduce in the artificial denture the same condyle action of the patient's mandible in relation to the artificial denture.

Although the location of the occlusal plane and condyle centers with face bows now in use can be accomplished with some degree of accuracy, it is neither easy nor completely accurate because no support is available to rigidly hold the face bow while the location of the condyle centers is sought. This is particularly apparent in attempting to accurately locate the condyle centers in edentulous cases.

Many dentures now in use are poorly fitted to the mandible ridge and, to produce properly fitting dentures, it is absolutely essential to accurately locate the condyle centers of the mandible. To accomplish this, it is vitally important to firmly hold the lower denture upon the mandible ridge and to rigidly support the face bow or hinge axis locator. The mandibular clamp embodying the principles of our invention effectively accomplishes these requirements, since the lower denture, or base plate, when cemented to the bite fork, acts as the top jaw and the pressure pads of the mandibular clamp as the lower jaw of the clamp. By this vice arrangement, not only is the denture firmly held on the mandible ridge, but a firm and rigid support is provided for any of the well-known types of face bows or for the hinge axis locator represented in dotted line in the drawings. Thus, by the use of the mandibular clamp embodying our invention, a dentist is provided with a rigid and effective support for any device he may employ to accurately locate the condyle centers of the mandible.

Since it is also vitally important that the patient and the mandible and other facial muscles be relaxed during the location of the hinge-axis, and since excessive weight upon or restriction of the mandible by the face bow and the mandibular clamp results in tenseness of the mandible muscles and effects the accuracy of the hinge axis location, the greatest accuracy is accomplished in locating the focal points of the condyles by the use of a hinge axis locator rather than by the use of face bows even when the same is employed with a mandibular clamp,

because the weight of a hinge axis locator is so imperceptible that it does not produce any tenseness in the lower mandible muscles during the time employed in locating the condyles.

The principal object of our invention is to provide a mandibular clamp to be used as a support for a face bow or hinge axis locator for more accurately and efficaciously finding the patient's hinge axis.

An equally important object of our invention is to provide a mandibular clamp which not only permits the accurate and rapid location of a patient's condyles, but such location can be accomplished without undue discomfort and unpleasantness to the patient.

A further object of our invention is to provide a mandibular clamp which is adapted for securely holding the bite fork in place, when the same is attached either to the existing dentition, trial base, or denture, and which allows for easy and quick disengagement of the clamp from the bite fork.

A still further object of our invention is to provide a mandibular clamp which gives complete accessibility to the center of a patient's chin, permitting its manipulation by the dentist without undue discomfort to the patient.

Another object of our invention is to provide a mandibular clamp having a complete range of adjustments to fit patients having different depths and widths of mandible and different saggitial angulations of the lower border of the mandible; which is easily attached to the tissues on the lower border of the mandible; which will not unduly stretch the mouth; and which will not interfere with the muscular attachments to the mandible and thereby affording comfort and relaxation to the patient during manipulation of the patient's chin.

A still further object of our invention is to provide a mandibular clamp which is sturdy, yet light in weight; compact, yet easy to apply; inexpensive, yet reliable in operation.

Other objects and advantages and novel characteristics of the invention will become apparent and more readily understood from the detailed description which follows, and from the accompanying drawings forming a part thereof, in which:

Fig. 1 is a perspective view of a mandibular clamp embodying the principles of our invention as applied to fanciful delineation of a female head, showing the mandibular clamp in full line and a hinge axis locator in dotted line attached thereto;

Fig 2 is a top plan view of the mandibular clamp and bite fork embodying the principles of our invention;

Fig. 3 is an elevational view of the mandibular clamp embodying the principles of our invention;

Fig. 4 is a sectional elevation of the mandibular clamp embodying the principles of our invention taken on the line 4—4 of Fig. 2 looking in the direction indicated but substantially enlarged;

Fig. 5 is a top plan view, partly in section, taken on line 5—5 of Fig. 4 looking in the direction indicated revealing some of the structural characteristics of our invention; and

Fig. 6 is a fragmentary top plan view, partly in section, taken on line 6—6 of Fig. 4 looking in the direction indicated.

The approximate position of the manidibular clamp embodying the principles of our invention when in use is clearly illustrated in Fig. 1 of the drawings. The clamp consists of a frame, designated generally by reference character A, the central body portion 1 of which forms a semi-circular arcuation. Body portions 2 and 3 of frame A extend lateraly from the sides of central body portion 1 and each has an identical semi-circular arcuation with the incurvation slightly greater than the incurvation of the arcuation of body portion 1.

The configuration of frame A as herein described and as graphically illustrated in Figs. 1 and 2, permits the insertion of central portion 1 into the mouth of a patient in conjunction with a bite fork, designated generally by reference character B, and presently to be described in greater detail. It also permits the body portions 2 and 3 to engage the corners of the mouth and thereby allow frame A to fit well under the chin of a patient without stretching the mouth or causing any other discomfort to the patient. The arcuations formed by the several body portions of frame A merge into arms 4 and 5 formed in body portion 1, each possessing the same characteristics including pin sized openings 6 and 7 respectively near their ends.

Threaded openings 8 and 9 are provided near the incurved ends of body portions 2 and 3 respectively. A pair of posts 10 and 11 are threadably engaged by openings 8 and 9 respectively and extend downwardly from frame A in parallel alignment. Lock nuts 12 (not shown) and 13 are threadably disposed about posts 10 and 11 respectively and, when these are positioned against the underside of body portions 2 and 3 of frame A, parts 10 and 11 are firmly held against possible rotation or disengagement from frame A.

Since posts 10 and 11 have the same structural characteristics, a detailed description of one post should suffice for the other. Posts 10 and 11, while cylindrical in general contour, each have an elongated flat surfaced cut-out 14 for the major portion of its length. A spiral spring 15, compressibly positionable about each post, is guided in its movement by the post. A spring retaining member 16, having a cylindrical socket 17 whose diameter is sufficient to permit unrestricted compression of spring 15, which is normally in extended position around each post, is threadably secured to the other end of each post.

A shaft 18, having an opening 19 extended therethrough whose diameter approximates the diameter of each post, is slidably positioned in relation thereto immediately above spiral spring 15. One end of shaft 18 is threaded and thumb nut 20 is threadably positioned thereon. A sleeve 21, having a pair of identical openings 22 and 23 transversely therethrough and whose diameters are slightly larger than the diameter of opening 19 of shaft 18, is positioned about a portion of shaft 18 and about each post for vertical movement in relation to each post and lateral movement in relation to shaft 18. Openings 22 and 23 of sleeve 21 each have a flat surface corresponding to the flat surface of cut-out 14 in each post, the purpose of which is to restrict the rotation of shaft 18 about its respective post and thus maintain the shaft in proper lateral position at all times. The flat surfaces of the sleeve openings contact the flat surface of cutout 14 of each post when sleeve 21 is forced to move laterally on shaft 18 as thumb nut 20 is rotated about the threaded portion of the shaft. A washer 24 is positioned about shaft 18 and interposed between thumb nut 20 and sleeve 21 to avoid metal to metal contact. A retaining screw 25 is threadably disposed at the end of shaft 18 to prevent the unintentional disengagement of the thumb nut 20 from shaft 18. From the foregoing it becomes obvious that the position of sleeve 21 in relation to shaft 18 is controlled by thumb nut 20 and that the restriction of the rotation of thumb nut 20 by screw 25 prevents, in turn, the rotation of shaft 2 around the post without interfering with its vertical movement since the flat surfaces of openings 22 and 23 of the sleeve coincide with the flat surface of cut-out 14. The shaft, of course, may be immobilized by applying lateral pressure on the sleeve so that the flat surfaces of the openings intimately contact the flat surface of cut-out 14 and thus act as a brake against the vertical movement of shaft 18.

Block 26, having a bore therethrough, the diameter of which approximates the diameter of the shaft 18, is positioned upon and is radially and axially adjustable relative to shaft 18. A sleeve 27, having a pair of identical openings 28 and 29, transversely thereof and whose diameters are slightly larger than the diameter of the bore in block 26, is positioned about block 26 and shaft 18 for lateral movement in relation to the shaft and vertical movement in relation to the block. One end of block 26 is threaded and thumb nut 30 threadably positioned thereon. When thumb nut 30 is rotated forwardly about the threaded end of block 26, the surfaces of openings 28 and 29 of sleeve 27 are forced against shaft 18 and consequently the block is securely held against shaft 18 and prevented from either radial or axial movement. A washer 31, is positioned about block 26 and interposed between sleeve 27 and thumb nut 30 to avoid metal to metal contact. To prevent the accidental removal of block 26 from shaft 18, a screw 32 is threaded into the end of shaft 18.

A chin pad support 33, designed to fit the contours of the under portion of the chin below the mandible, has a chin pad 34 secured thereto in any desirable manner and made of rubber or other soft material. The chin pad support is rotatably secured to the top of sleeve 26 by any desirable means as by bolt 35, but its rotation is controlled by interposing between the top of sleeve 26 and the under portion of the chin pad support 33, a washer 36 and an annular collar 37 made of rubber or any other frictional material. Shaft 18, and its concomitant elements heretofore described in relation to one of the posts is, of course, duplicated on the other post and function in every particular in the identical manner as clearly illustrated in Figs. 1 and 2 of the drawings.

Bite fork B, previously referred to herein, is composed of a stem 38 to which body member 39 is fixedly secured. Body member 39 has pairs of tynes 40 and 41 extending therefrom. The pair of tynes 40 consist of the outer tynes which have contours coinciding with the contours of arms 4 and 5 of frame A, when the frame is juxtaposed thereupon and these tynes extend slightly beyond the arms 4 and 5. Each of the tynes 40 has a pin 42 positioned thereon so as to enter and snugly fit into pin openings 6 and 7, when the arms 4 and 5 of frame A are juxtaposed upon tynes 40. The pair of tynes 41 extend but slightly beyond frame A and are confined between tynes 40, as shown in Figs. 1 and 2 of the drawings.

Modus Operandi

The mandibular clamp embodying our invention and as herein fully described acts as a support for a hinge axis locator or face bow and as a means to rigidly hold the bite fork securely on the mandible while the hinge axis of the mandible is located and marked. This is accomplished by attaching the bite fork B to the lower teeth, the lower denture, the lower bite rim, trial base, or any other combination of dentition, then inserting the bite fork and its attachment into the mouth (when appropriate such as in edentulous cases). Frame A of the mandibular clamp is then placed upon the bite fork so that the pins on tynes 40 fit into the openings in frame A. The chin pads 34 are then properly positioned under the chin of the patient as shown in Fig. 1 and then locked against displacement by applying the needed pressure on sleeves 21 and 27 by turning thumb nuts 20 and 30. In this manner the dentition material attached to bite fork B is held securely against the mandible and the mandibular clamp is in place in relation to the patient's chin to give the necessary support for the hinge axis locator shown in dotted line in Fig. 1 or for any common type of face bow without interfering with the dentist's desire to manipulate the patient's chin while attempting to locate the hinge axis of the mandible. When the hinge axis locator or face bow is placed upon stem 38 of the bite fork B, the normal steps for locating the hinge axis is taken with the assurance, however, of having a rigid support therefor provided by the mandibular clamp.

Although we have found in actual practice that the

mandibular clamp shown and described herein is efficient and satisfactory in operation, it is obvious that various changes may be made in the details of construction which, nevertheless, constitute equivalents thereof falling within the scope of this invention. We, therefore, do not wish to limit ourselves to the exact construction and arrangement of elements shown herein except as the same may be limited by the following claims in which we claim:

1. A clamp for holding a denture, base plate or bite rim, firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semi-circular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, a pair of shafts, one for each post, slidably positionable upon said posts, resilient means carried on each post adapted for compression by the movement of said shafts, means associated with each of said shafts for holding said resilient means under compression while simultaneously immobilizing the movement of said shafts, a pair of chin pads, one for each shaft, adjustably positioned thereon, means on each shaft for moving said chin pads radially and axially in relation to said shafts, means associated with the last mentioned means for arresting such movement of the chin pads when desired, and a bite fork positioned under the frame and held securely thereagainst when the chin pads are placed firmly under the chin.

2. A clamp for holding a denture firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semicircular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, a pair of shafts, one for each post, slidably positionable upon said posts, resilient means carried on each post adapted for compression by the movement of said shafts, means associated with each of said shafts for holding said resilient means under compression while simultaneously immobilizing the movement of said shafts, a pair of chin pads, one for each shaft, adjustably positioned thereon, means on each shaft for moving said chin pads radially and axially in relation to said shafts, and means associated with the last mentioned means for arresting such movement of the chin pads when desired.

3. A clamp for holding a denture firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semicircular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, a pair of shafts, one for each post, slidably positionable upon said posts, resilient means carried on each post adapted for compression by the movement of said shafts, means associated with each of said shafts for holding said resilient means under compression while simultaneously immobilizing the movement of said shafts, a pair of chin pads, one for each shaft, adjustably positioned thereon, and means on each shaft for moving said chin pads radially and axially in relation to said shafts.

4. A clamp for holding a denture firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semicircular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, a pair of shafts, one for each post, slidably positionable upon said posts, means associated with each of said shafts for immobilizing their movement, a pair of chin pads, one for each shaft, adjustably positioned thereon, means on each shaft for moving said chin pads radially and axially in relation to said shafts, and means associated with the last mentioned means for arresting such movement of the chin pads when desired.

5. A clamp for holding a denture firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semicircular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, a pair of shafts, one for each post, slidably positionable upon said posts, means associated with each of said shafts for immobilizing their movement, a pair of chin pads, one for each shaft, adjustably positioned thereon, and means on each shaft for moving said chin pads radially and axially in relation to said shafts.

6. A clamp for holding a denture firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semicircular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, each of said posts being cylindrical but having an elongated flat surface thereon, a pair of shafts, one for each post, slidably positionable upon said posts, resilient means carried on each post adapted for compression by the movement of said shafts, means associated with each of said shafts for holding said resilient means under compression while simultaneously immobilizing the movement of said shafts, and for preventing the rotation of said shafts about said posts, a pair of chin pads, one for each shaft, adjustably positioned thereon, means on each shaft for moving said chin pads radially and axially in relation to said shafts, and means associated with the last mentioned means for arresting such movement of the chin pads when desired.

7. A clamp for holding a denture firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semicircular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, each of said posts being cylindrical but having an elongated flat surface thereon, a pair of shafts, one for each post, slidably positionable upon said posts, resilient means carried on each post adapted for compression by the movement of said shafts, means associated with each of said shafts for holding said resilient means under compression while simultaneously immobilizing the movement of said shafts, and for preventing the rotation of said shafts about said posts, a pair of chin pads, one for each shaft, adjustably positioned thereon, and means on each shaft for moving said chin pads radially and axially in relation to said shafts.

8. A clamp characterized as in claim 1 in which the means associated with each of said shafts for immobilizing the movement of said shafts comprises, a pair of sleeves, one for each shaft, positioned around said shaft for lateral movement in relation thereto, but confined in its movement by each post, and a pair of thumb nuts, one for each shaft, threadably secured thereto, for forcing said sleeves firmly against said posts.

9. A clamp characterized as in claim 1 in which the means on each of said shafts for moving said chin pads radially and axially in relation to said shafts comprises, a block, one for each shaft, slidably and rotatably positioned on said shafts, a pair of sleeves, one for each block, positioned around said blocks for vertical movement in relation thereto, but confined in its movement by each shaft, and a pair of thumb nuts, one for each

shaft, threadably secured to said blocks for forcing said sleeves firmly against said shaft.

10. In means for measuring a patient's dental characteristics, in combination, a mandibular clamp for holding a denture, base plate or bite rim, firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semi-circular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, a pair of shafts, one for each post, slidably positionable upon said posts, resilient means carried on each post adapted for compression by the movement of said shafts, means associated with each of said shafts for holding said resilient means under compression while simultaneously immobilizing the movement of said shafts, a pair of chin pads, one for each shaft, adjustably positioned thereon, means on each shaft for moving said chin pads radially and axially in relation to said shafts, means associated with the last mentioned means for arresting such movement of the chin pads when desired, a bite fork positioned under the frame and held securely thereagainst when the chin pads are placed firmly under the chin, and a hinge axis locator adjustably positioned on the bite fork.

11. In means for measuring a patient's dental characteristics, in combination, a mandibular clamp for holding a denture firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semi-circular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, a pair of shafts, one for each post, slidably positionable upon said posts, resilient means carried on each post adapted for compression by the movement on said shafts, means asociated with each of said shafts for holding said resilient means under compression while simultaneously immobilizing the movement of said shafts, a pair of chin pads, one for each shaft, adjustably positioned thereon, means on each shaft for moving said chin pads radially and axially in relation to said shafts, a bite fork associated with said mandibular clamp, and a dental face bow positioned on said bite fork.

12. In means for measuring a patient's dental characteristics, in combination, a mandibular clamp for holding a denture firmly upon the mandible and for supporting a hinge axis locator or denture face bow comprising, a frame having semi-circular arcuations therein so as to permit the insertion of its central portion into the mouth of a patient and the remaining portion to fit the contour of the face adjacent the corners of the mouth, a pair of posts extending downwardly from the frame, a pair of shafts, one for each post, slidably positionable upon said posts, means associated with each of said shafts for immobilizing their movement, a pair of chin pads, one for each shaft, adjustably positioned thereon, means on each shaft for moving said chin pads radially and axially in relation to said shafts, a bite fork associated with said mandibular clamp, and a hinge axis locator supported by said bite fork.

13. The combination characterized as in claim 10 in which the means associated with each of said shafts for immobilizing the movement of said shafts comprises, a pair of sleeves, one for each shaft, positioned around said shaft for lateral movement in relation thereto, but confined in its movement by each post, and a pair of thumb nuts, one for each shaft, threadably secured thereto, for forcing said sleeves firmly against said posts.

14. The combination characterized as in claim 10 in which the means on each of said shafts for moving said chin pads radially and axially in relation to said shafts comprises, a block, one for each shaft, slidably and rotatably positioned on said shafts, a pair of sleeves, one for each block, slidably positioned around said blocks, but confined in its movement by each shaft, and a pair of thumb nuts, one for each shaft, threadably secured to said blocks for forcing said sleeves firmly against said shafts.

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