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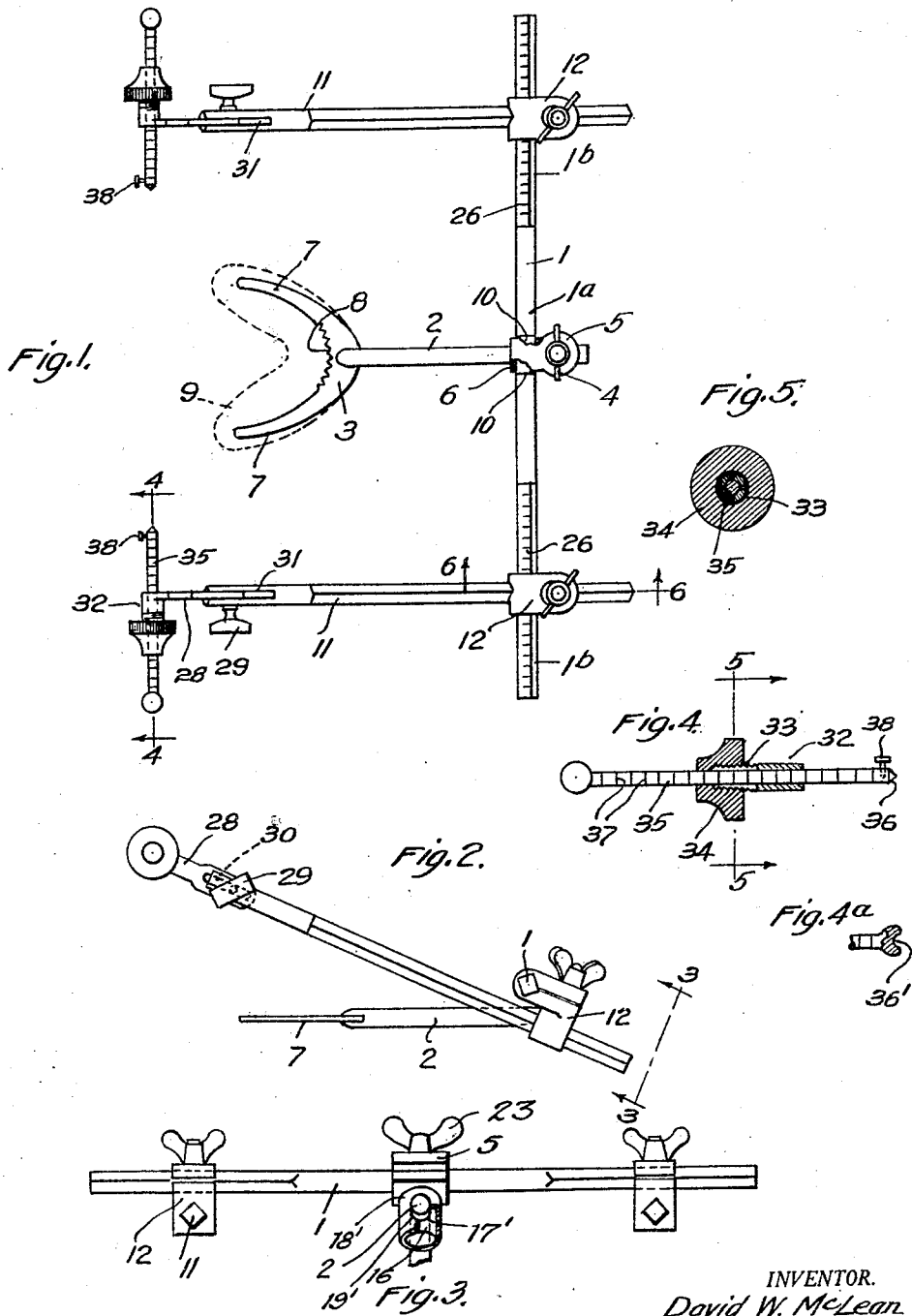
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1,786,915

DENTAL APPARATUS

Filed May 9, 1928

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 8.

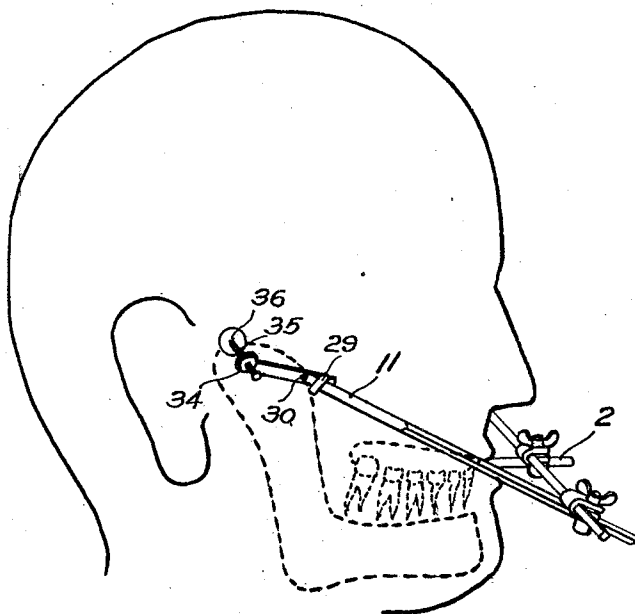
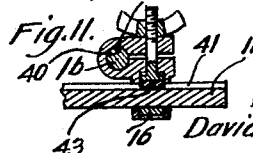
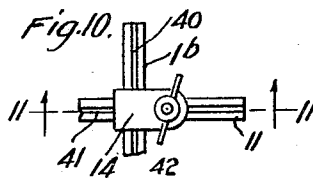
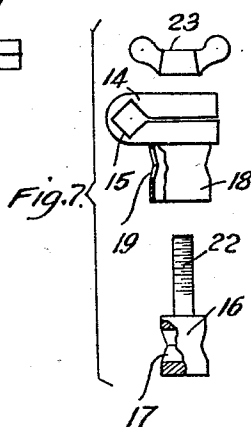
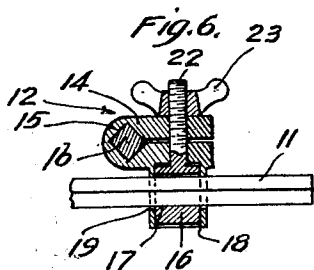
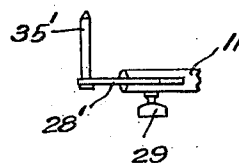


Fig. 9.



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## UNITED STATES PATENT OFFICE

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## DENTAL APPARATUS

Application filed May 9, 1928. Serial No. 276,209.

This invention relates to dental face bows for use in determining the relative position of the condyle axis of the jaw of a patient with respect to the position of the teeth of such patient, particularly for use in orienting models of the patient's teeth or jaws in corresponding relative positions upon dental articulators, such as are employed by dentists in the preparation of artificial dentures.

10 The principal object of the invention is to provide such an apparatus having novel means for adjustment, whereby the operation thereof is simplified and the accuracy of determining the desired relationships and of transferring the same to the articulator is increased.

Such face bows are ordinarily provided with axis-locating members adapted to be adjusted to approximately the positions of the respective ends of the condyle axis, and a further object of the invention is to provide a face bow in which said axis-locating members are so mounted as to permit free and independent adjustment of each locating member in any desired direction.

25 A further object of the invention is to provide for coarse adjustment of the side arms of the face bow by relative movement of said arms with respect to the bite plate which carries the impression indicating the position of the patient's teeth, and for a finer and independent adjustment of each axis-locating member with respect to the side arm on which it is mounted, so that each of said locating members may be accurately adjusted to the exact position of the corresponding end of the condyle axis.

40 A further object of the invention is to provide scale means for indicating the positions of the respective side arms with respect to one another and to the bite plate, in a direction transverse to the face of the patient.

The accompanying drawings illustrate embodiments of my invention and referring thereto—

Fig. 1 is a plan view of a face bow constructed in accordance with my invention.

Fig. 2 is a side elevation thereof.

Fig. 3 is an elevation on line 3—3 in Fig. 2.

50 Fig. 4 is a longitudinal section of one of

the axis-locating members taken on line 4—4 in Fig. 1.

Fig. 4a is a view of the inner end of a modified form of axis-locating member.

Fig. 5 is a section on line 5—5 in Fig. 4.

Fig. 6 is a section of the clamping means securing one of the side arms to the transverse member of the face bow, said section being taken on line 6—6 in Fig. 1.

Fig. 7 is a view of the parts of said clamping member disassembled from one another.

Fig. 8 is a perspective view showing the manner in which the face bow is applied to the head of a patient for determining the position of the condyle axis.

Fig. 9 is a partial plan view showing the use of fixed axis-locating members or pins.

Fig. 10 is a partial plan view of a modification of the means for preventing relative rotation of the transverse bar and side bars.

Fig. 11 is a section on line 11—11 in Fig. 10.

The face bow may comprise a transverse member or cross bar 1, upon the central portion of which is mounted a round rod or arm 2 carrying bite plate 3 at its inner end. Arm 2 may be secured to transverse member 1 by suitable adjustable clamping means 5 provided with wing nut 4. The central portion 1a of the transverse member is preferably round or cylindrical in shape and extends through a cylindrical opening or recess 6 in clamping means 5 so as to permit turning of the transverse member relative to the bite plate, about the longitudinal axis of said transverse member. Clamping means 5 is preferably of such construction as referred to hereinafter, but in any event is such as to permit both sliding and turning movement of arm 2 and transverse member 1 therein, and also permit horizontal swinging movement of arm 2 relative to said transverse member, when said clamping means is loosened, while serving to hold said members from such movement when said clamping means is tightened.

The bite plate 3 may be of any usual or suitable shape or design and preferably comprises two rearwardly extending prongs 7 conforming roughly to the outline of the

human jaw, and is also preferably serrated as at 8 for the purpose of more tightly holding the "bite" thereto. Said bite comprises a body of wax or modelling compound which may be softened by heat or otherwise and mounted upon the bite plate as indicated for example by the dotted outline at 9, for receiving an impression of the teeth of a patient and also for temporarily securing a face bow to the lower jaw of such patient as hereinafter described. Any suitable form of bite plate may be used in conjunction with my face bow instead of that shown in Fig. 1, and the same may be mounted in any suitable manner upon the transverse member 1 although as stated, I prefer to mount the bite plate so as to permit relative movement of the transverse member 1 with respect to said bite plate.

The transverse member 1 may advantageously be provided with suitable means to enable centering of the bite plate thereon, such means comprising for example centering marks or lines 10 on the transverse member in the positions of the two side faces of clamping means 5 when said clamping means is in the center of said transverse member.

Side arms 11 are mounted at the respective ends of transverse member 1, as by means of clamping devices 12, in such manner as to permit relative sliding or translative movement between each side arm and said transverse member, while preventing relative turning or rotative movement between said members about axes extending longitudinally of the respective side arms, about axes extending perpendicular to both the transverse member and the respective side arms, and also if desired, about an axis extending longitudinally of the transverse member. For this purpose the end portions 1b of the transverse member and the forward portions of side arms 11 may, as shown particularly in Figs. 1, 3 and 6, be of square or other polygonal section.

Each of the clamping devices 12, as shown more particularly in Figs. 6 and 7, may comprise a split collar or U-shaped piece 14 having a recess or opening 15 of square or other shape to conform to the cross section of the portions 1b. A pin 16 extends through the arms of the member 14 and is provided with an opening or recess 17 of square or other suitable shape to conform to the cross section of the side arms 11. The lower arm of the U-shaped member 14 is provided with a clamping sleeve 18 around the enlarged lower portion of pin 16 through which side arm 11 passes, and such sleeve is provided with openings 19 of similar shape to the opening 17 in said pin. The upper end of pin 16 is threaded as at 22 and a wing nut 23 or the like is provided thereon. It is apparent that when the wing nut is loosened the corresponding side arm 11 is free to slide in the openings 17 and 19 and the portion 1b of the trans-

verse member is free to slide in opening 15, while relative rotation of either of said members is prevented. Tightening of wing nut 23, however, draws the pin 16 upwardly so as to clamp arm 11 between the bottom of opening 17 in said pin and the top of openings 19 in sleeve 18, while the arms of the split member 14 are also squeezed between pin 16 and wing nut 23 so as to clamp the portion 1b of the transverse member.

Instead of making the end portions of the transverse member and the side arms, and the recesses in the clamping means through which they extend, of square or other polygonal cross-section, other means may be provided for preventing relative turning movement of said parts. For example, as shown in Figs. 10 and 11, the end portions 1b of the transverse member may be provided with keyways 40 and the side arms may be provided with keyways 41, while key means 42 and 43 may be provided in the clamping member 14 and pin 16 respectively.

The clamping device 5 for mounting the bite plate arm 2 on transverse member 1 may be substantially the same as the clamping device 12 above described, with the exception that, as shown in Fig. 3, the sleeve 18' is a separate piece so as to permit the above mentioned horizontal swinging movement of arm 2, and the opening 6 through which said transverse member passes, and the openings 17' and 19', through which arm 2 passes, are of circular cross section and are free from key means or other means preventing relative turning movement of said parts. This last described type of clamping means is also shown and is more fully described and claimed in my co-pending application for "dental apparatus" Ser. No. 171,160, filed February 26, 1927, and which has now matured into Patent #1,705,223 of March 12, 1929.

Each of the end portions 1b of the transverse member may advantageously be provided with scale means 26 for indicating the relative position of the corresponding side arms in a transverse direction, for the purpose hereinafter described.

Each side arm 11 is provided at its rear end with a short adjusting arm or portion 28. A small clamping screw 29, threadedly mounted adjacent the rear end of each side arm, passes through a longitudinal slot 30 in said adjusting arm, which extends within a recess 31 in the side arm, so that by loosening said screw said arm may not only be rotated in a substantially vertical plane extending from front to rear, but may also be moved longitudinally so as to vary its effective radius of rotation, and may thus be readily and accurately adjusted to the desired position. The adjusting arm 29 may be provided at its outer end with a transversely extending sleeve 32 having a threaded and slotted grip-

ping portion 33 upon which is mounted clamping nut 34. An axis locating member or pin 35 may be mounted in each sleeve 32, said pin being slidably adjustable in said sleeve upon loosening of clamping nut 34 but being held tightly in position therein upon tightening of said nut. The axis-locating members may be pointed at their inner ends as indicated at 36, as for use with an articulator whose axis rod has recessed ends, or said locating members may be formed with recessed head portions 36' as indicated in Fig. 4a as for use with articulators whose axis rods are pointed at their ends. Each axis-locating member is advantageously provided with scale means 37 for indicating the position thereof in a transverse direction. Stop means, consisting for example of small screws or pins 38, may be provided adjacent the inner ends of the respective members 35, to prevent dislodgment or loss thereof from the sleeves 32 upon loosening of clamping means 34.

Instead of adjustably mounting the axis-locating members on the adjusting portions of the side arms, said axis-locating members may, if desired, be rigidly mounted thereon or secured thereto. The construction is shown in Fig. 9, in which each axis-locating member comprises a pin 35', pointed or recessed at its inner end, and rigidly secured in suitable manner to the end of adjusting arm 28'.

The manner of using the above described face bow is as follows, it being assumed that the position of the ends of the condyle axis of a patient has already been determined and has been marked in some manner either directly on the patient's cheeks or upon any suitable members secured in fixed position over the ends of such axis, in well known manner, and that the face bow is to be used simply for the purpose of determining the relationship between the patient's teeth or jaws and the ends of said condyle axis, and for enabling models of the patient's jaws to be mounted in an articulator in corresponding relationship to the condyle axis of said articulator.

The "bite" is first prepared either by first taking an impression of the patient's teeth or jaws in suitable softened wax or modelling compound and then inserting the bite plate 3 therein, or by first mounting such softened wax or modelling compound on the bite plate and then taking such impression therein. The "bite" is then chilled to harden it, and trimmed if necessary, and is then re-inserted in proper position between the patient's teeth or jaws, and the face bow mounted in position upon arm 2 of the bite plate, as shown in Fig. 8. The side arms 11 are then adjusted roughly so as to bring the two axis-locating members 35 to a position approximating the determined location of the respective ends of the condyle axis. Such rough adjustment is effected as to height by loosening the clamping means 5 and rotating transverse member 1 therein relative to the bite plate. The lateral or transverse adjustment is made by loosening the clamping members 12 and sliding the respective side arms 11 in and out on the portions 1a of the transverse member, while the adjustment from front to rear is effected by sliding the side arms forwardly or rearwardly in the respective clamping members 12. When these rough adjustments have been effected the clamping members 5 and 12 are tightened so as to hold the parts 1, 2 and 11 in fixed relative position.

Each axis-locating member 35 is then accurately brought to the position of the corresponding end of the condyle axis, such accurate or fine adjustment in the vertical plane parallel to the patient's cheek being effected by loosening clamping screws 29 so as to permit movement of the corresponding adjusting arm 28 both about said screws as a center and also backward and forward with respect thereto, and the transverse or "in and out" adjustment being effected by loosening nut 34 so as to permit the locating member 35 to be moved inwardly to just touch the patient's cheek or other means on which the position of the condyle axis is marked. Screw 29 and nut 34 are then tightened so as to hold the locating member in this position.

When fixed axis-locating members 35' are employed, as shown in Fig. 9, the transverse, or "in and out" adjustment thereof is effected entirely by transverse movement of the respective side arms 11 with respect to the transverse member 1.

In either case, the face bow may be so adjusted as to quickly and accurately bring the inner ends of the axis locating members to the respective ends of the condyle axis, so that the face bow thus records the position of the "bite," and hence of the patient's teeth or jaws, with respect to the condyle axis. The face bow may then be removed, and placed upon an articulator with the axis locating members in alignment with the respective ends of the condyle axis rod or member of said articulator. If models of the patient's teeth or jaws are then placed in proper relation to the "bite" block on the face bow, such models may be mounted upon the articulator and will have their proper relative positions with respect to the condyle axis.

One purpose of the scale means 26 on the transverse member is to adapt the face bow for use with certain types of articulators in which no means are provided for extending the condyle axis rod outwardly to meet the axis locating members on the face bow. With such articulators it is necessary to move the axis-locating members inwardly (or outwardly) to meet the ends of the condyle axis rod, and in order to preserve the proper rela-

relationship between the direction of the condyle axis and the position of the jaws it is highly important that both axis-locating members be moved inward or outward equally. The calibrations on said transverse member permit this equal movement of the two side arms to be readily accomplished. The calibrations 37 on the adjustable axis-locating pins 35, in case the same are used, may also be employed for the same purpose. Furthermore, by combined readings of the calibrations 26 and 37, in conjunction with centering of the bite plate on the transverse member by means of centering marks 10, the transverse distances of the respective ends of the condyle axis from the center of the patient's jaws may be determined.

I claim:

1. A dental face bow comprising a transverse member, a bite plate projecting rearwardly from said transverse member and provided with means rotatably supporting said bite plate on said transverse member so as to permit relative rotation of said transverse member with respect to said bite plate about an axis parallel to said transverse member, means for clamping said transverse member and bite plate in fixed relative position, side arms projecting rearwardly and upwardly from the respective ends of said transverse member, means connecting said side arms to said transverse member and slidably but non-rotatably engaging both the transverse member and the respective side arms, so as to permit independent relative sliding movement of each side arm with respect to the transverse member, longitudinally of said transverse member and longitudinally of the side arm, while preventing relative rotation thereof about an axis extending longitudinally of the side arm and also about an axis extending perpendicular to both the transverse member and the side arm, means for clamping said connecting means to hold said transverse member and side arms in fixed relative positions, and axis locating members mounted at the rear ends of the respective side arms.

2. A dental face bow comprising a transverse member, a bite plate projecting rearwardly from said transverse member and provided with means rotatably supporting said bite plate on said transverse member so as to permit relative rotation of said transverse member with respect to said bite plate about an axis parallel to said transverse member, means for clamping said transverse member and bite plate in fixed relative position, side arms projecting rearwardly and upwardly from the respective ends of said transverse member, means connecting said side arms to said transverse member and slidably but non-rotatably engaging both the transverse member and the respective side arms, so as to permit independent relative

sliding movement of each side arm with respect to the transverse member, longitudinally of said transverse member and longitudinally of the side arm, while preventing relative rotation thereof about an axis extending longitudinally of the side arm and also about an axis extending perpendicular to both the transverse member and the side arm, means for clamping said connecting means to hold said transverse member and side arms in fixed relative positions, adjusting arms at the rear ends of the respective side arms and mounted for adjustment to different positions within substantially vertical planes which include said side arms and which are perpendicular to said transverse member, and axis locating members mounted on said adjusting arms and adjustable thereon in a direction parallel to said transverse member.

3. A dental face bow comprising a transverse member, a bite plate adjustably mounted thereon, two side arms projecting rearwardly from the respective end portions of said transverse member, adjusting arms mounted adjacent the rear ends of the respective side arms for both rotative and translative adjustment in the vertical planes of said side arms, and axis locating members mounted on the respective adjusting arms and extending inwardly therefrom.

4. A dental face bow comprising a transverse member, a bite plate projecting rearwardly from said transverse member and adjustably mounted thereon, means for clamping said transverse member and bite plate in fixed relative positions, side arms projecting rearwardly and upwardly from the respective ends of said transverse member, axis locating members projecting inwardly from the rear portions of the respective side arms, said axis locating members extending parallel to said transverse member and perpendicular to the vertical planes of the respective side arms, and means adjustably connecting the respective side arms to said transverse member and slidably but non-rotatably engaging both the transverse member and the respective side arms, so as to permit sliding movement of the side arms inward and outward on said transverse member and to also permit forward and backward sliding movement of said side arms while maintaining said side arms at all times in such relative positions with respect to the transverse member as to keep said axis locating members parallel to said transverse member.

In testimony whereof I have hereunto subscribed my name this 17th day of April 1928.

DAVID W. McLEAN.