

March 12, 1929.

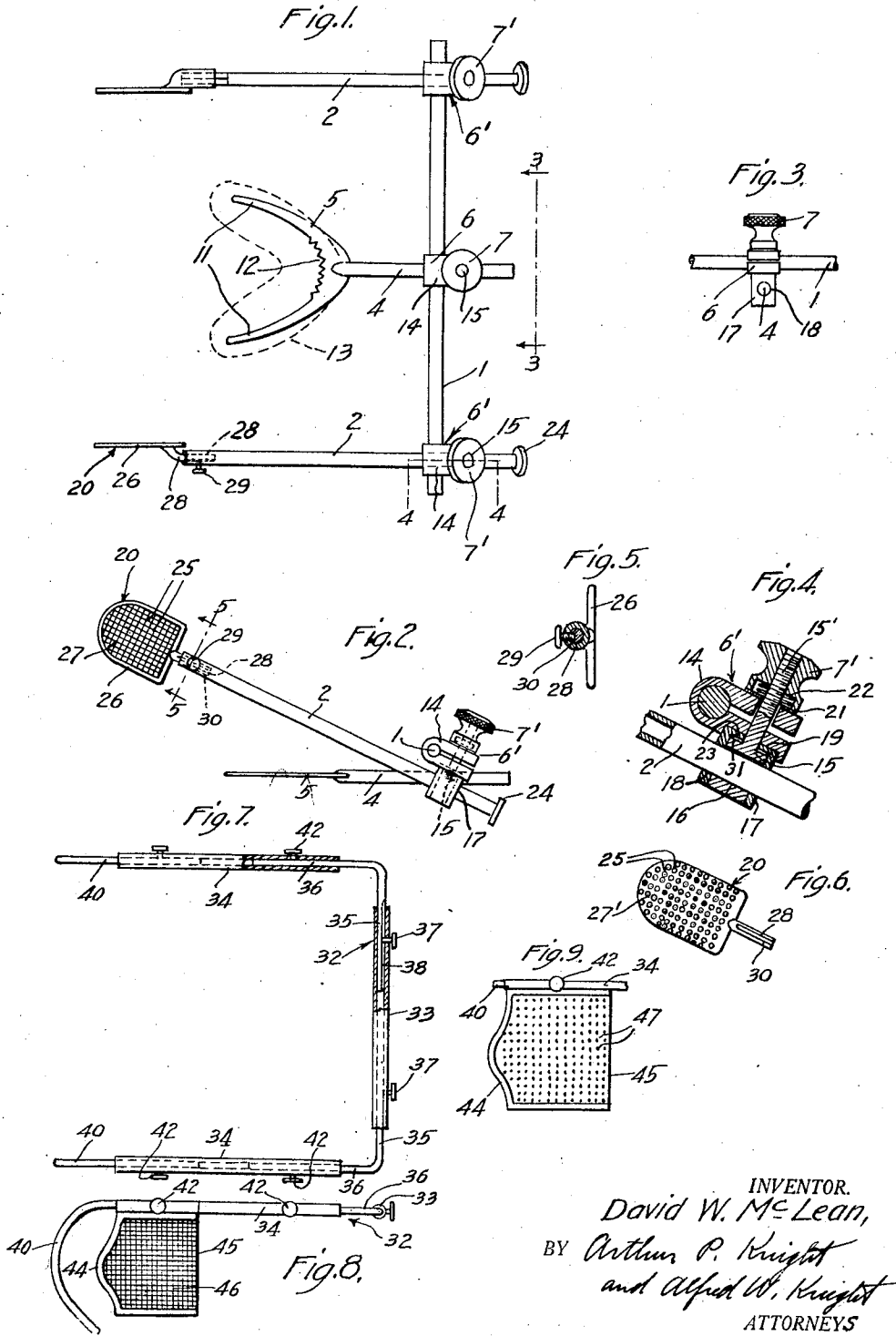
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1,705,223

DENTAL APPARATUS

Filed Feb. 26, 1927

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 10.

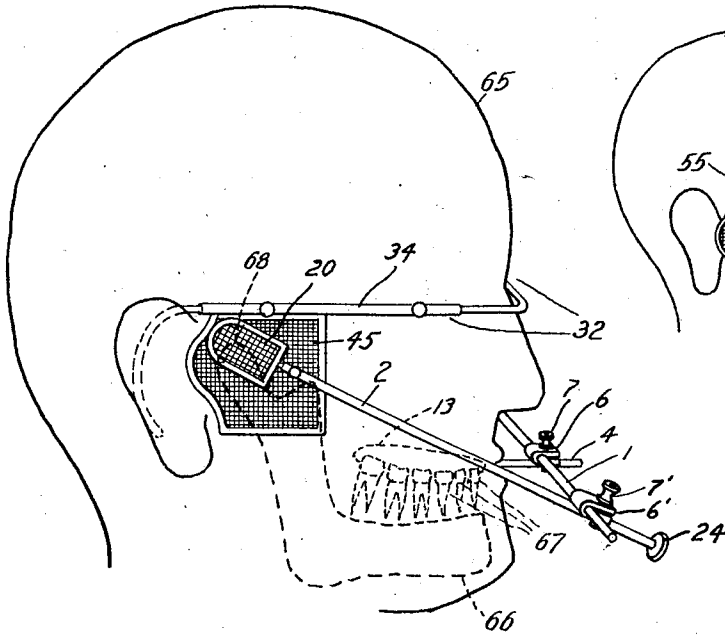
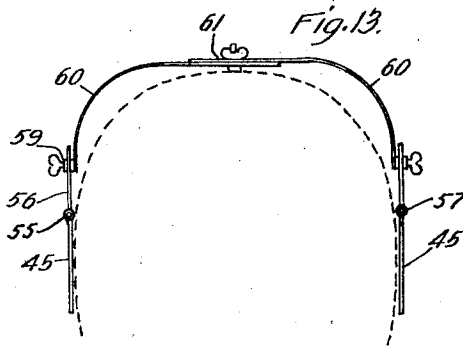
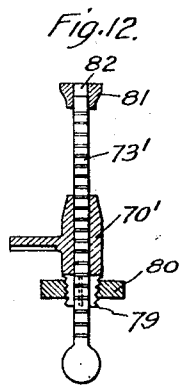
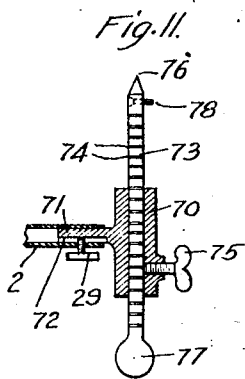
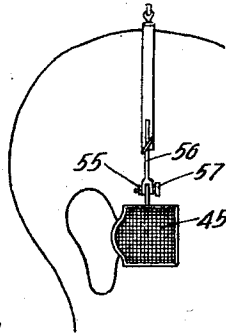


Fig. 14.



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UNITED STATES PATENT OFFICE.

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DENTAL APPARATUS.

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This invention relates to apparatus for use by dentists in determining certain characteristic measurements of the jaw of a patient, and particularly for determining the exact relative position of the axis upon which the lower jaw is hinged, for the purpose of properly adjusting an articulator for use in preparing a set of artificial teeth or any dental restorations for such patient.

The principal object of the invention is to provide means for determining the position of the above mentioned hinge axis more accurately and quickly than has heretofore been possible.

A further object of the invention is to provide an adjustable face bow whose side bars are formed at their rear ends so as to receive removable screen or grid members for use in the location of the hinge axis as hereinafter described and so as to thereafter permit said screen or grid members to be removed and replaced by caliper members which may be set to the location so determined and thereafter mounted in an articulator in the usual manner.

The apparatus which I use for this purpose comprises essentially a pair of field defining members each having a multiplicity of marks distributed over its surface, means mountable upon the head of a patient and carrying said field defining members so as to hold the same in fixed position adjacent the face of a patient in the region of the hinge axis of the jaw; a frame, means for securing said frame to the lower jaw of the patient so as to move therewith, and a pair of screen members mounted upon said frame so as to move over the respective field defining members upon movement of the lower jaw; each of said screen members having a multiplicity of sight openings distributed over its surface.

The frame above mentioned may advantageously take the form of an adjustable face bow comprising a cross bar, a bite plate adjustably secured thereto, and a pair of arms also adjustably secured thereto and extending rearwardly and upwardly therefrom alongside the face of the patient and having means at their ends for attachment of the respective screen members thereto. Detachable caliper members are also preferably provided, which may also be attached to the arms of the face bow after the screen members are removed therefrom, as hereinafter set forth.

Other objects and advantages of my invention will appear hereinafter.

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

Fig. 1 is a plan view of the face bow or frame portion of my device, showing the screen members attached to the side bars thereof.

Fig. 2 is a side elevation of the same.

Fig. 3 is a view taken on line 3—3 in Fig. 1.

Fig. 4 is a section on line 4—4 in Fig. 1.

Fig. 5 is a section on line 5—5 in Fig. 2.

Fig. 6 is a side elevation of a modified form of screen member.

Fig. 7 is a plan view of one form of device for supporting the field defining members.

Fig. 8 is a side elevation thereof, showing one of the field defining members thereon.

Fig. 9 is a side elevation of a modified form of field defining member.

Fig. 10 is a perspective view showing the manner of applying my device in actual use.

Figs. 11 and 12 are sectional views of caliper members for mounting on the arms of the face bow when the screen members are removed therefrom.

Fig. 13 is a front view of another form of device for supporting the field defining members.

Fig. 14 is a side elevation thereof.

The frame or face bow may comprise cross bar 1 and arms 2 adjustably mounted adjacent the ends thereof. At the center of cross bar 1 is mounted an arm 4 carrying bite plate 5 at its inner end. The arm 4 may be secured to bar 1 by suitable adjustable clamping means 6 provided with thumb-nut 7 and of such construction that when said thumb nut is loosened the parts are free to slide or rotate with respect to one another to permit adjustment of the bite plate to the desired position, while tightening of said thumb nut serves to clamp the parts securely in the position to which they are so adjusted. One form of clamping means which I have devised for this purpose is described in detail hereinafter. The bite plate 5 may be of any usual or suitable shape or design and preferably comprises two rearwardly ex-

tending prongs 11 conforming roughly to the outline of the human jaw and is also preferably serrated as at 12 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 13, for receiving an impression of the teeth of a patient and also for temporarily securing the 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 apparatus instead of that shown in Fig. 1, and the same may be mounted in any suitable manner upon the cross bar of the face frame or face bow.

The arms 2 may also be mounted on bar 1 by suitable adjustable clamping means 6', which are similar to the clamping means 6 above mentioned and are similarly provided with thumb nuts 7'.

The clamping means 6 and 6' may each comprise, as shown particularly in Fig. 4, a split collar or yoke 14 rotatably and slidably mounted on cross bar 1 and a pin 15 extending through the arms of said yoke and having a round opening 16 through which the arm 2 (or 4) may pass. A sleeve 17 is provided around the lower end of pin 15, and said sleeve is locked to said pin by means of an inwardly projecting flange 23 on the sleeve engaging a shoulder 31 on the pin. Sleeve 17 has a round opening 18 also adapted to receive the arm 2 (or 4). Said sleeve bears against the face of recess 19 in the lower arm of yoke 14. The upper end of pin 15 is threaded as at 15' to receive the tightening nut 7' (or 7). Friction washer 21 and spring 22 are preferably provided between 7' (or 7) and yoke 14. It is apparent that when the nut 7' (or 7) is loosened the yoke 14 will be free to both turn and slide on the cross bar 1, while the arm 2 (or 4) will also be free to both turn and slide in pin 15 and sleeve 17, and furthermore the pin 15 will be free to turn in yoke 14, so that any desired adjustment of arm 2 (or 4) with respect to cross bar 1 may be secured. Tightening of nut 7' (or 7) however, not only serves to hold pin 15 from turning in yoke 14, but also clamps the arm 2 (or 4) between said pin and sleeve 17 and at the same time compresses yoke 14 so as to cause the same to tightly grip cross bar 1. The above described clamping means for mounting the arms 2 and arm 4 on the cross bar possess certain advantages over those now in common use for similar purposes, and constitute an additional feature of the preferred embodiment of my invention. It will be understood, however, that any other suitable means may be used for adjustably mounting said arms upon said cross bar. It

will be noted as a particular advantage of the clamping means shown, that all parts thereof are held between shoulder 31 on pin 15 and nut 7' (or 7) so that no parts thereof will become detached or lost even if arm 2 (or 4) should be removed therefrom.

Each of the arms 2 is preferably provided with a head 24 at its forward end so as to prevent the same from being accidentally disconnected from the cross bar. Said arms are so formed at their rear ends as to receive detachable screen or grid members 20 or to receive suitable caliper members, and for this purpose said arms may, as shown, advantageously consist of tubes. Each screen member 20 is provided with a multiplicity of sight openings 25, and may comprise for example a frame 26 and a wire mesh screen 27 within said frame, as shown in Fig. 2, or a perforated plate 27' as in Fig. 6. Each screen member may further comprise a shank portion 28 adapted to fit within the tubular arm 2, and said arm may be provided with a set screw 29 engaging in groove 30 in said shank portion so as to rigidly secure the screen member to the arm. Said screen or grid members may, however, be secured by any suitable means to the ends of the arms, or if desired they may be so constructed as to fit on the arms of any of the well-known forms of face bow now in common use.

The means for mounting the field defining members upon the head of a patient may comprise, as shown in Figs. 7 and 8, a yoke 32 having a cross member 33 adapted to rest upon the bridge of the nose of the patient and a pair of side members or temples 34 extending back alongside the face and over the ears of such patient. The cross member 33 and the side members 34 may advantageously be tubular in shape, and adjustable connecting means may be provided between said members, consisting for example of small rods bent at a right angle and each having a portion 35 engaging in cross member 33 and a portion 36 engaging in one of the side members 34. Cross member 33 may be provided with set screws 37 for rigidly securing the connecting members thereto, and the portions 35 are preferably grooved as at 38, so as to permit said portions, upon loosening of set screw 37, to slide inwardly or outwardly in cross member 33 so as to adjust the distance between the side members 34, but to prevent turning of the portions 35 in said cross member so as to always preserve the two side members in the same plane. A curved or bowed rod 40 may be mounted in the rear end of each of the tubular side members 34 and may be so formed as to fit around behind the ear of the patient. The tubular side members 34 preferably fit loosely enough upon the members 36 and 40 so as to permit relative turning and sliding

movement thereof and are preferably provided with set screws 42 for holding the parts in any desired relative longitudinal or rotative position to which they may be adjusted.

Each of the field defining members may comprise a frame 44 secured at its upper edge to one of the side members 34 and a sheet or plate 45 of suitable thin material mounted within said frame so as to be disposed in the region adjacent the hinge axis of the jaw when the yoke 32 is placed in position. Said field defining members may consist of cardboard or light metal or other thin material, and each one is provided with a multiplicity of marks distributed over its surface, said marks consisting, for example, of cross-section lines suitably spaced apart and extending in two perpendicular directions thereon as indicated at 46 in Fig. 8, or of dots or other characteristic marks as indicated at 47 in Fig. 9.

Other means may be used for mounting the field defining members upon the head of a patient. For example, as shown in Figs. 13 and 14, each field defining member 45 may be pivotally mounted as at 55 upon a rod 56, a tightening screw 57 being provided, which may be loosened to permit the field defining member to be swung inwardly or outwardly about the axis of the hinge or tightened so as to hold said field defining member in any position to which it may be so adjusted. The respective rods 56 may be adjustably mounted as at 59 on resilient clamping arms 60 which are in turn adjustably connected together at their upper ends as at 61, so as to form an adjustable resilient clamping means adapted to fit over the head of the patient and to support the field defining members 45 in the desired positions.

The operation of the above described apparatus may best be understood by referring to Fig. 10, in which the outline of the head of a patient is indicated at 65. The lower jaw bone is indicated in dotted lines at 66 and the lower set of teeth at 67. The purpose for which this apparatus is to be used is for the accurate location of the condyles or the upper ends of the lower jaw bone, which are indicated at 68, or more strictly speaking, for the location of the imaginary axis upon which the lower jaw may be considered as hinged or about which the lower jaw rotates during the initial portion of the opening movement thereof.

The field defining members 45 are first mounted in position close to the face of the patient and in the general region of the condyles, for example by means of the yoke 32 as shown. The bite is then inserted in the patient's mouth and an impression of the teeth is taken therein, after which a small amount of soft wax or other adhesive material is placed in the impression of the

lower teeth and the bite reinserted. By now closing the jaws, the bite is caused to adhere to the lower teeth so that the bite plate will move with the lower jaw. The above described face frame or face bow may then be connected to the bite plate arm 4, and adjusted so as to bring the screen members 20 opposite the general position of the condyles and over portions of the respective field defining members.

The parts are then in the position shown in Fig. 10, and if the patient moves the lower jaw slightly, the entire frame or face bow will rotate therewith about the hinge axis thereof. It will be seen that if the hinge axis is located within the area of the screen members 20, the point on each screen member which is in line with such axis will remain stationary during such motion of the jaw. The exact point which remains stationary can be easily detected by looking through the sight openings or meshes 25 of the screen member and noting which one of said openings does not move with respect to the marks on the field defining member. The point thus located may be marked upon the field defining member by inserting a suitable marking instrument such as a pencil point through the particular sight opening at which no motion occurs. If no such point of relative non-motion is found then it is apparent that the position of the hinge axis is outside the area of the screen member and said screen member should be adjusted until some such point of non-motion is found. The above operations may be carried out first at one side of the face and then at the other, so that a point is found and marked on each field defining member indicating the location of the hinge axis.

In order that the indications thus obtained may be readily applied to dental articulators for use in preparing dental restorations, I prefer to provide caliper members which are adapted to fit the rear ends of the tubular side arms 2 of the face bow. Each of such caliper members may comprise as shown in Fig. 11, a sleeve portion 70 having a stem 71 adapted to fit within the end of one of the arms 2 and grooved as at 72 for engagement of set screw 29 therewith. A pin 73 is slidably mounted within the sleeve 70 and may if desired be provided with graduations 74 spaced longitudinally thereof so as to indicate the position of the pin in said sleeve. A set screw 75 is provided for holding the caliper pin 73 in the desired position. Pin 73 may be pointed at its inner end as at 76 and is preferably provided at its outer end with an enlarged head 77, and adjacent its inner end with a small retaining screw 78, for preventing displacement of the pin from sleeve 70. A slightly different form of caliper member is shown in Fig. 12 in which the sleeve 70 is provided

with a threaded expanding jaw chuck 79 and clamping nut 80 for holding the pin 73' in the desired position. The pin 73' is shown as provided at its inner end with a flange or collar 81 so as to provide a small recess 82. The two types of caliper pins shown in Fig. 11 and Fig. 12 may be used interchangeably, depending upon the shape or construction of the ends of the shaft or part of the articulator to which the measurements are to be applied.

The above described face bow or frame comprising the adjustably secured members 1 and 2 may also be used for any of the other purposes for which the common type of face bow is used, and may be provided with any of the usual or suitable attachments for adapting it to such uses.

While I prefer to use field defining means as above described in conjunction with the screen or grid members, it may be possible in some cases to operate without any field defining means, as the point of non-motion of the screen members may be observed and marked directly on the face of the patient, although this method of operation is obviously less accurate than that above described.

The term "sight openings" as used herein in describing the grid or screen members is not to be understood as limited to actual physical openings or holes in such members. For example, instead of screen members of the type above described, it is possible to use sheets of transparent material capable of being perforated, such as celluloid or the like, such sheets having cross section lines or similar means which divide the same into a plurality of spaces which constitute sight openings through which the marks on the field defining members may be viewed. In using screen or grid members of this latter type, after the point of non-motion has been found the transparent material may be pierced or perforated with any suitable sharp pointed instrument so as to permit such point to be marked on the field defining member.

I claim:

1. A dental apparatus for locating the hinge axis of the lower jaw, comprising a pair of field defining members, means for mounting said field defining members in position adjacent the face of a patient and opposite the respective ends of the hinge axis of the jaw, a frame, means for securing said frame to the lower jaw of the patient so as to move therewith, and a pair of screen members mounted upon said frame in position to move over the respective field defining members upon movement of the lower jaw, each of said field defining members having a multiplicity of marks distributed over its surface and each of said screen members having a multiplicity of sight openings distributed over its surface.

2. In an apparatus for locating the hinge axis of the lower jaw, a field defining member having marks distributed over its surface, means for mounting said field defining member in fixed position adjacent one end of the hinge axis of the jaw of a patient, a screen member having sight openings distributed over its surface, and means for securing said screen member to the lower jaw of said patient so as to dispose said screen member in position over said field defining member and to cause said screen member to move with the lower jaw upon rotative movement thereof about said hinge axis.

3. An apparatus for use in locating the hinge axis of the lower jaw, comprising a bite plate, a cross bar, arms extending rearwardly and upwardly from said cross bar, means adjustably securing said arms and said bite plate to said cross bar, two screen members mounted at the rear ends of the respective arms in positions adjacent the respective ends of said hinge axis and having sight openings distributed over their surfaces, two field defining members having marks distributed over their surfaces and means for mounting said field defining members upon the head of a patient and in position between said screen members and the face of the patient.

4. An apparatus as set forth in claim 3, said screen members being removably mounted on said arms, and said apparatus comprising in addition means for rigidly securing said screen members to said arms.

5. In an apparatus for locating the hinge axis of the jaw, a yoke comprising a tubular cross member adapted to rest upon the bridge of a patient's nose, two tubular side members, two rods each bent at an angle and each having its ends engaging respectively in one end of said tubular cross member and in the forward end of one of said tubular side members so as to permit relative motion between said parts, means for securing said rods to the respective tubular members so as to prevent such relative motion, two curved rods adapted to engage behind the ears of a patient and engaging in the rear ends of the respective tubular side members and movable therein, means for securing said curved rods to the respective tubular side members, and a field defining member secured to each of said tubular side members and extending downwardly therefrom and provided with marks distributed over its surface.

6. In a face frame, a cross bar, a side arm, and means for adjustably securing said members together, said adjustable securing means comprising a split collar mounted on one of said members, a pin extending through the ends of said split collar, a sleeve surrounding said pin at one side of said split collar and bearing against the collar, and a clamp-

ing nut screwing on the other end of said pin and bearing on the opposite side of said collar, said pin and said sleeve having openings aligned with one another, and the other 5 of said members extending through said openings, and said sleeve having an inwardly projecting flange at its inner end engaging a shoulder on said pin so as to hold said sleeve thereon regardless of removal of said 10 other member from said openings.

7. In a dental apparatus, a bite plate having a forwardly extending arm, a cross bar, and means adjustably securing said members together, said adjustable securing means 15 comprising a split collar mounted on one of said members, a pin extending through the ends of said split collar, a sleeve surrounding said pin at one side of said split collar and bearing against the collar, and a clamp- 20 ing nut screwing on the other end of said pin and bearing on the opposite side of said collar, said pin and said sleeve having openings extending therethrough, and the other of said members extending through said 25 openings, and said sleeve having an inwardly

projecting flange at its inner end engaging a shoulder on said pin so as to hold said sleeve thereon regardless of removal of said other member from said openings.

8. In a dental apparatus, a face frame 30 comprising a cross member and two side members, a tubular recess at the rear end of each of said side members, a pair of screen members having shank portion fitting in the tubular recesses in the respective side mem- 35 bers so as to permit removal of said screen members from said side members, and means for securing said screen members to said side members.

9. In a dental apparatus, in combination 40 with the side arm of a face frame, a screen member having a plurality of sight openings distributed over its surface and having means engageable with said side arm for 45 mounting the same thereon.

In testimony whereof I have hereunto subscribed my name this 19th day of February, 1927.

DAVID W. McLEAN.