

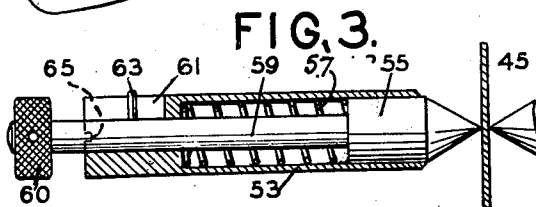
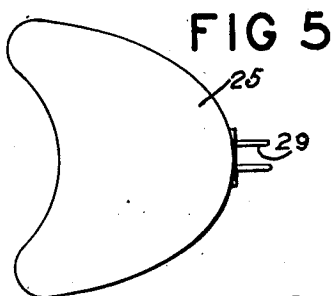
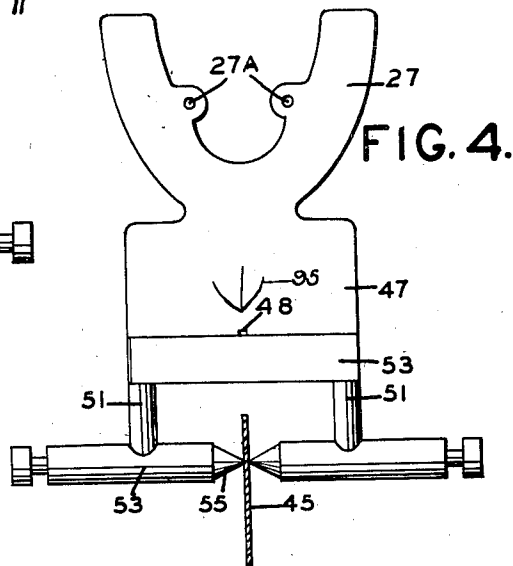
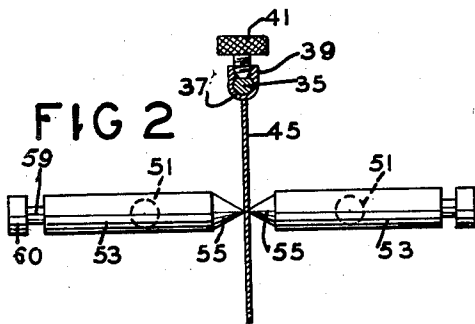
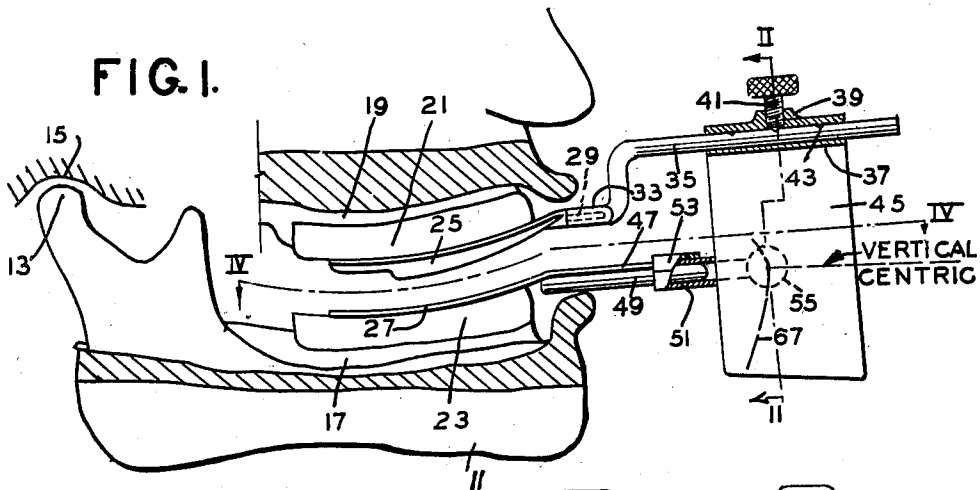
Nov. 23, 1943.

A. J. BIGGER ET AL

2,334,898

MEANS AND METHOD FOR MAKING ARTIFICIAL DENTURES

Original Filed Feb. 23, 1942 2 Sheets-Sheet 1



INVENTORS
ARCHIBALD J. BIGGER
ELMER E. FRANCIS JR.,

BY

BY *J. H. Weatherford*

Nov. 23, 1943.

A. J. BIGGER ET AL

2,334,898

MEANS AND METHOD FOR MAKING ARTIFICIAL DENTURES

Original Filed Feb. 23, 1942 2 Sheets-Sheet 2

FIG. 6.

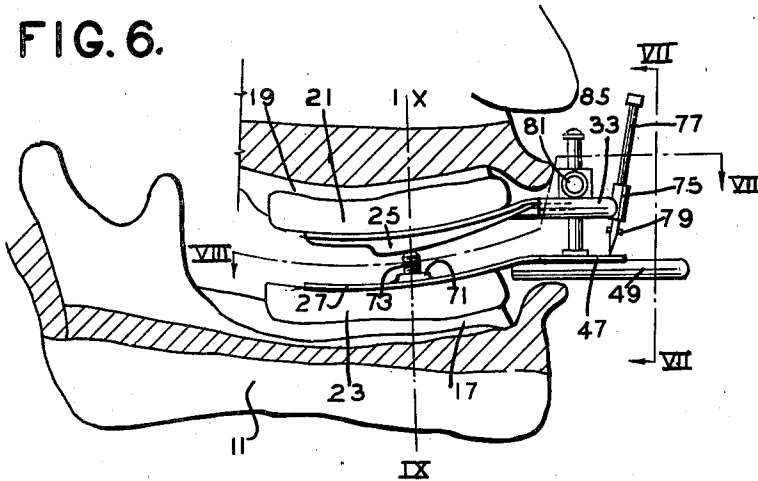


FIG. 7.

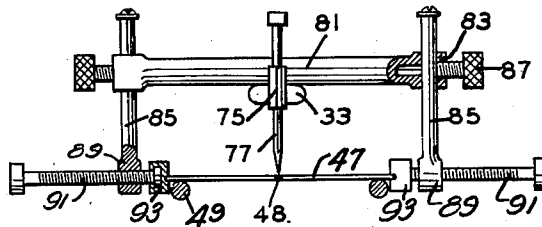


FIG. 8.

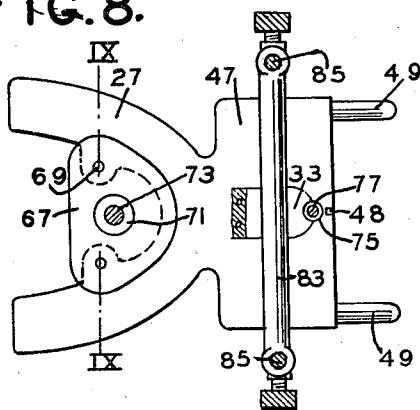
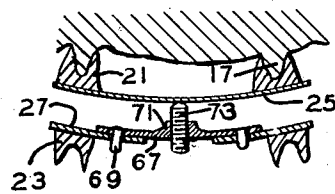


FIG 9



INVENTORS
ARCHIBALD J. BIGGER
ELMER E. FRANCIS JR

BY

BY *James Weatherford*
Atty

UNITED STATES PATENT OFFICE

2,334,898

MEANS AND METHOD FOR MAKING
ARTIFICIAL DENTURESArchibald J. Bigger and Elmer E. Francis, Jr.,
Memphis, Tenn.Refiled for abandoned application Serial No.
431,982, February 23, 1942. This application
August 16, 1943, Serial No. 498,784

5 Claims. (Cl. 32—19)

This invention relates to improvements in heretofore known apparatus and method employed in the making of artificial teeth, and particularly relates to means for determining the proper relative positioning of the jaws at the time the teeth normally should effect contact, the lateral movement of the jaws after such contact has been accomplished, and for accomplishing the transfer of such information to an articulator for use in usual manner thereafter in holding a set of teeth.

It especially relates to those conditions in which all the teeth of both jaws, or of one jaw only, have been removed or are missing and there is no direct means of determining at just what point in the closure of the jaws such contact should occur.

It is well known that the lower jaw which accomplishes all the movement, extends rearwardly and upwardly on the opposite sides of the face terminating in condyles which are shiftably mounted in respective sockets, which effect in combination with the condyles a hinge movement as the teeth move into biting contact, and as they seat, permit lateral, and forward and backward movement accomplishing a grinding movement of the lower on the upper teeth. This grinding movement of the seating surfaces of the teeth is accomplished according to well known theories along a substantially spherical surface having, according to Count Spee, a radius of about four inches, this surface, if produced, lying tangent to the top of the condyles.

It has further been well known in the practice of making a set of artificial teeth, to introduce between the upper and lower jaws a block or mass of wax softened by warming and by closure of the jaws to obtain impressions of the upper and lower jaws, the wax being cooled and hardened while the jaws are closed, and from these impressions to make models of the upper and lower jaws on which upper jaw and lower jaw models, base plates are made, to which plates the teeth are eventually secured, the under and upper surfaces respectively of these upper and lower base plates being formed on the outer and inner surfaces of a sector of the shell of an eight inch sphere.

Subsequently to their formation and before teeth attachment these base plates are firmly seated in the mouth of the patient on the upper and lower jaws respectively, being held by suction or otherwise.

Carrier plates, hereinafter called "carriers," of thin metal, and of similar arcuate conformation,

are temporarily secured to these base plates, as by wax, these carriers having forward extensions which protrude from the mouth, the lower carrier extension being in the form of a horizontal tablet which is waxed on its upper surface for use, and the upper carrier extension adapted to detachably receive and support a vertically disposed depressible pin which may be lightly pressed into contact with the tablet. Movement of the lower jaws laterally, and backward and forward causes the pin to form on the tablet what is known as a "Gothic trace" subsequently used after the base plates are replaced on the models in positioning the models in the articulator for further operations, in what is known to the profession as horizontal centric relation.

While care is taken in lining up the carriers in the mouth it is obvious that the toothless jaws afford little or no clue as to just what their relation was to the meeting surfaces of the teeth, or as to how close the one should approach the other to reestablish normal grinding conditions, and the scribing of the Gothic trace, reflecting as it should these grinding movements, is often accomplished with the mouth under-closed or over-closed, or even with the mouth closing or opening during the scribing of the lines, with troubles resulting that was long considered unaccountable.

It has been generally assumed that the change in movement about the condyles from hinge to shifting movement occur because of the tooth seating. More careful study of the problem, however, indicates that the same shift occurs whether seating is present or not and that for each mouth there is a definite point of change. Further, it is found that for accuracy and real value the Gothic trace must be taken with the jaws in tooth seating position and that the change therefrom is the source of many troubles.

The primary object of the present invention is to provide means for determining the centric line, or line which determines the position of the meeting surfaces of the teeth as the jaws close.

To provide means for determining the proper spacing apart of the upper and lower jaws when such position is reached, and as reflected in the spacing apart of the base plates.

To provide means for holding the jaws in properly spaced position during the scribing of the Gothic trace.

To provide means to center the plates laterally and space them vertically apart, after the determination of the lateral Gothic trace and the

determination of the vertical centric line, and to rigidly secure the plates against relative displacement before removal from the mouth, and so hold them during transfer from the mouth, in order that the models may relatively be properly positioned for placing and securing in place in the articulator for subsequent operations.

To provide means for securing the carrier as to a face bow for determining the individual angle of shift of the condyles which occurs after the bite point is reached.

The means by which the foregoing and other objects are accomplished and the manner of their accomplishment will readily be understood from the following specification upon reference to the accompanying drawings, in which:

Fig. 1 is a side view of a patient's face with the flesh broken away to disclose a side elevation of the base plates and the carriers therefor with vertical trace tablets secured to the upper carrier, and vertical trace scribing points secured to the lower carrier, the view showing the vertical trace scribed in closing, and over-closing the lower jaw and the scribing point at centric position.

Fig. 2 is a vertical section taken on the line II—II of Fig. 1.

Fig. 3 is an enlarged sectional detail on the same line of one of the vertical trace scribing points, and its mounting.

Fig. 4 is a sectional plan taken on the line IV—IV of Fig. 1, showing the lower carrier and Gothic trace tablet, and the vertical trace scribing points secured thereto with the vertical trace tablet in section between such points.

Fig. 5 is a plan view of the upper carrier.

Fig. 6 is a side view corresponding to Fig. 1, but with the vertical trace plate and points respectively removed, and a vertically disposed scribing pin secured to the upper carrier for co-operation with the Gothic trace tablet carried by the lower base plate, the pin being in scribing contact with such tablet, and showing the means for limiting relative approach of the carrier plates, and the base plates carried thereby, to their properly spaced position during the scribing of the Gothic trace.

Fig. 7 is a front elevation taken as on the line VII—VII of Fig. 6.

Fig. 8 is a plan view taken as on the stepped line VIII—VIII of Fig. 6.

Fig. 9 is a transverse section on the line IX—IX of Fig. 6.

Referring now to the drawings in which the various parts have been designated by numerals:

11 is the lower jaw, 13 a condyle, and 15 the condyle socket. 17 is the ridge from which the lower teeth originally projected upward and 19 is the complementary ridge of the upper jaw. 21 is the upper backing plate which has been formed in usual and well known manner, seated and held on the ridge 19, as by suction or the use of well known aids for promoting adherence. 23 is the complementary lower backing plate, which is similarly seated and held on the lower ridge 17. 25 and 27 are carriers of thin sheet metal which are respectively secured, as by wax or otherwise, to the upper and lower backing plates respectively. Preferably these carriers are of spherical conformation, that is, arcuate sections of the surface of a sphere of the four inch radius, indicated by Count Spee, the upper carrier in plan being of the general shape shown in Fig. 5, and the lower carrier of the shape shown in Figs. 4 and 8.

Projecting forwardly from the carrier 25 are a pair of pins 29 which are adapted to interchange-

ably engage in sockets 31, or 33, Figs. 1 and 6; during steps in the initial and subsequent operations.

In Fig. 1 the socket 31 carries a single forwardly extending rod 35 which may be, as most clearly indicated in Fig. 2, of circular cross section with the top flattened.

Slidably mounted on the rod 35 is a sleeve 37 having a boss 39 adapted to receive a threaded clamping screw 41, the bar having along its upper flattened surface depressions 43 in any one of which the screw 31 may be seated to effect stable positioning of the sleeve with reference to the rod, both against longitudinal movement along the rod or turning movement therearound.

Secured to and depending from the underside of the sleeve 37 is a vertically disposed sheet-like member 45, hereinafter designated vertical trace tablet, this tablet being likewise centrally aligned fore and aft with the upper carrier 25.

Forwardly, the carrier 27 has a horizontal extension 47, hereinafter designated Gothic-trace tablet, this tablet, for purposes hereinafter disclosed, having a central notch 48 in its outer or forward edge.

Underlying the Gothic-trace tablet 47 and extending horizontally forward therefrom are a pair of rigidly secured pins 49 on which are detachably mounted a pair of sleeves 51 which are rigidly secured together by a transversely disposed member 53, the sleeves 51 respectively carrying at their forward ends transversely disposed hollow members in which are slidably mounted an axially aligned pair of plungers 55 having their inner ends sharpened to form facing scribing pins. Each plunger 55 respectively is inwardly urged by a very light compression spring 57, the plunger 55 having a reduced diameter shank 59 to form a shoulder against which one end of the spring abuts, a complementary shoulder being formed in the hollow member 53 for the other end of the spring. The shank 59 of the plunger extends outward beyond the end of the hollow member and may have a head 60 thereon. Preferably a slot 61 is cut in one side the hollow member adjacent the outer end, and a pin 63, adapted to slide in this slot, is secured in the shank 59. The hollow member is also provided at its outer end with a shallow notch 65 whereby the plunger may be retracted until the pin 63 passes beyond the end of the member and be then turned into engagement with the shallow notch 65 to hold the plunger in such retracted position until it need be released for use.

In Fig. 6 the vertical trace mechanism just described has been removed from the upper and lower base plates 25 and 27 leaving free the protruding pins 29 from the carrier 25, and the pins 49 from the carrier 27. An auxiliary member 67 is placed on the carrier 27, this member having downwardly projecting pins 69 which engage in the holes 27—A, Fig. 4, and is centered thereby. Projecting upward from this member 67 is a hub 71 from which a threaded pin 73 projects further upward, this pin being upwardly adjustable into contact with the underside of the upper carrier 25 before removal of the vertical trace parts and with the plungers 55 at centric level.

The socket 33 carries at its outer end a vertically disposed sleeve 75, in which is slidably disposed a pin 77, hereinafter called the Gothic-trace pin, used for scribing traces on the Gothic-trace tablet 47, this pin being held against dis-

placement and loss, as by a transversely disposed pin 79.

Also transversely disposed relatively to, and rigidly secured to the socket 33, is a bar 81 which carries on its opposite outer ends hubs 83, in which are slidably disposed vertical posts 85, these posts respectively being held against turning and in desired position of vertical adjustment by means of set screws 87. At their lower ends, the posts 85 have integral hubs 89, which carry threaded pins 91, which may be adjusted inward or outward with respect to such hubs. These threaded pins 91 have on their inner ends rotatable shoes 93, each having a notch adapted for engagement with a side edge of the Gothic-trace tablet 47. Each of the pins 91 may be turned to engage its shoe with an edge of the tablet or retract it and free it therefrom. When so retracted, the corresponding set screw 87 may be loosened and the post 85 may be raised and turned to entirely free the tablet from interference by the shoes or posts during lateral or other movement of the tablet.

Operation

In using the device the wax impression is taken in usual manner, the models made, and from them the upper and lower base plates made. These plates are then placed in the mouth, as is usual, and secured therein by suction, either with or without the addition of such aids as are well known. The lower carrier is placed in the mouth and secured to the lower base plate in usual manner, as by wax, the plate being carefully centered in so placing.

The upper carrier 25 is then placed against the upper base plate 21 and centered and secured thereon. It may be found necessary in doing this to engage the socket 31 of the rod 35 on the pins 29 and to move the vertical trace tablet into engagement with the notch 48 in the center of the outer edge of the Gothic-trace tablet 47 to effect definite centering.

After setting of the upper base plate, if this tablet has been used to effect centering, it is necessary that it be removed to permit placing of the vertical-trace scribing pins. With the vertical-trace tablet removed the sleeves 51 of the vertical-trace pin holder are secured on the pins 49 and the two vertical-trace pins are retracted and held in retracted position by turning their respective pins 64 into engagement with the shallow notches 65. The vertical-trace tablet is then coated carefully on both sides with a thin layer of wax, and is placed on and adjusted as close to the transverse member 53 as is possible without interfering with the movement of the tablet in opening and closing the mouth. The patient is required to fully open his mouth and the two plungers released against the opposite side of the tablet. The patient is caused to close his mouth and to continue the closing past the normal line of closure and until the two carriers 25 and 27 substantially contact. In this movement the plungers 55 scribe on opposite sides of the tablet arcuate lines 67, the lower portion of these lines below the centric point being substantially circular arcs about the condyles as centers. These arcs break sharply at the centric point due to displacement above that point of the condyles in their sockets, the portion of the lines above the centric being sometimes merely a curve of much shorter radius, as indicated in Fig. 1, and at other times, an irregular line, even slightly off-set at such centric point, and in any event being

determinable by visual inspection so that it may be marked on the tablet for subsequent use.

After marking the centric point or line on the tablet, the auxiliary member 67 is placed on the bottom carrier 27 and centered by the pins 69. The threaded pin 73 is then adjusted until it contacts the under surface of the upper carrier 25 with the vertical-trace scribing pins at centric. The vertical-trace tablet, together with the rod 35, is removed from the upper carrier 25 and the vertical-trace pin removed from the lower centric 27.

The socket 33, with the Gothic-trace pin 77 and the centering and locking mechanism is engaged, as in Fig. 6, with the pins 29 of the upper carrier 25. The posts 35 are loosened, raised, and turned to entirely free the shoes 93 from interference with movement of the Gothic-trace tablet 47, and the Gothic-trace 95, indicated for clearness only in Fig. 8, is traced by movement of the jaws in usual manner, the pin 77 being lightly held in contact with the tablet by pressure of the fingers. In this movement, however, differing distinctly from usual practice, the lower jaw is closed until the pin 73 engages the underside of the upper carrier 25, and in the movement of the lower jaw this pin is held in such engagement, so that the trace is accomplished with the two jaws held in the exact relative positioning that they would have had, had all the teeth been present and the movement have been made by normal movement of the so equipped lower jaw.

Additionally a face bow may be used, in well known manner, and the condyle angles be determined for the opposite sides of the face, but such operation being not essential or confined to the present device, need not here be described.

After the Gothic-trace has been scribed on the tablet 47 the Gothic-trace pin 77 is brought, by movement of the jaws, to the center of the Gothic-trace. The posts 85 are lowered, and turned to face the shoes 93 toward the edges of the Gothic-trace tablet, and the screws 91 run in until the notches of the shoes 93 engage the opposite edges of the Gothic-trace tablet, the shoes being oppositely tightened against the tablet to be sure that it is perfectly centered with regard to the Gothic-trace pin. The set screws 87 are then tightened to lock the posts 85 against vertical movement and the device thus centered and locked may be removed from the mouth, bringing with it the upper and lower base plates and holding these base plates in locked alinement.

After removal the models may be placed in their respective base plates and the device thus rigidly held be set up in the articulator and such subsequent operations as may be desired be performed.

It will be understood, with reference to the opposed horizontal plungers 55 and scribing pins or points thereof, that while two are shown and preferred only one is absolutely necessary. Should one only be used it is preferable to back up the cooperating vertical trace tablet against pressure of the single scribing pin. It will also be understood while the male portions 29 and 49 respectively of the coupling parts are shown and described as projecting from the plate carriers, they may as readily be on the parts to be supported by such carriers and be received in sockets in such carriers.

It will further be understood that the nomenclature of the parts herein has been selected somewhat arbitrarily in order that as far as pos-

sible each part may have a distinctively different name from other parts, and particularly so that the word "plates" could be reserved for the dentures themselves and that such selection of names has no other significance.

This case is a refile of application Serial No. 431,982 filed February 23, 1942, now abandoned.

And it will be still further understood that the details of construction are, in general, selected largely for illustration only and may be varied from without in any way departing from the spirit and inventive disclosure herein shown, described and claimed.

We claim:

1. A device usable in connection with models or other jaw carried supports in a patient's mouth, for determining relative closure positioning of the jaws at which correct grinding movement of the jaws takes place, said device including a flat vertically positioned record-receiving member, disposed in alinement with the fore and aft center line of the mouth, a tracing point substantially at right angles to said member, means respectively for supporting said record member from one of said models and said point from the other thereof in cooperating contact with said member, whereby, on closure of the jaws, to record on said member a curve reflecting relative approach of said jaws toward correct closure positioning, and a further curve reflecting over-closure, and form a record usable for visual determination of such correct position.

2. A device in accordance with claim 1, in which said member and point are removable to permit use of said models in accomplishing further records.

3. A device usable in connection with models or other jaw carried supports in a patient's mouth,

for determining, in the absence of meeting teeth, the relative closure positioning of the jaws at which correct grinding movement of the jaws takes place, said device including a thin record-receiving plate aligned vertically along the fore and aft center line of the mouth and carried by one of said supports, a pair of axially aligned tracing points disposed on opposite sides of said plate and carried by the other of said supports, and means urging said points into cooperating contact with opposite sides of said plate, said points being adapted, on closure movement of the jaws, respectively to scribe on opposite sides of said plate curves reflecting relative approach of said jaws to correct closure positioning, and over-closure movement of said jaws therebeyond.

4. A device usable in connection with models or other jaw carried supports in a patient's mouth, for determining relative closure positioning of the jaws at which correct grinding movement of the jaws takes place, said device including a vertically positioned record-receiving member, disposed in alinement with the fore and aft center of the mouth, a tracing point, means respectively for supporting said record member from one of said models and said point from the other thereof in scribing contact with said member, whereby, on closure of the jaws, to record on said member a curve reflecting relative approach of said jaws toward correct closure positioning, and a further curve reflecting over-closure, and form a record usable for visual determination of such correct position.

5. A device in accordance with claim 4, in which said member and point are removable to permit other use of said models.

ARCHIBALD J. BIGGER.
ELMER E. FRANCIS, JR.