June 9, 1936. C. A. REITH 2,043,394

APPARATUS FOR MAKING ARTIFICIAL DENTURES

Filed Oct. 7, 1933 2 Sheets-Sheet 1

Fig. 1.

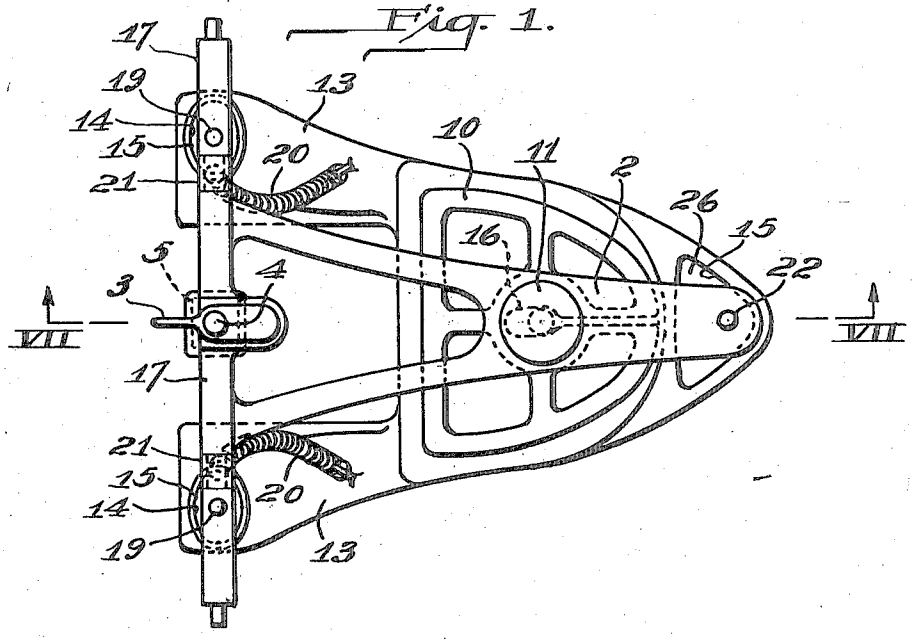


Fig. 2.

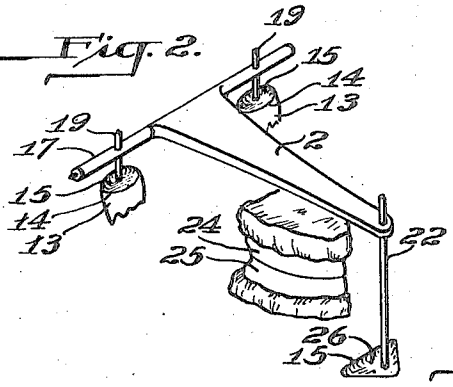


Fig. 3.

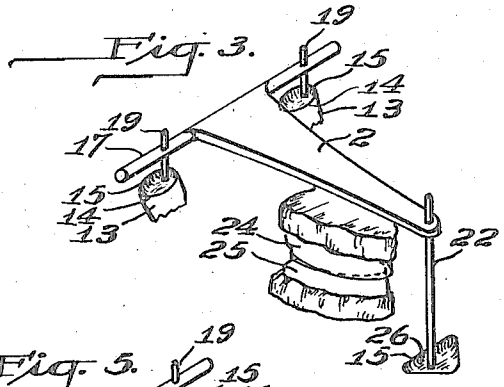


Fig. 4.

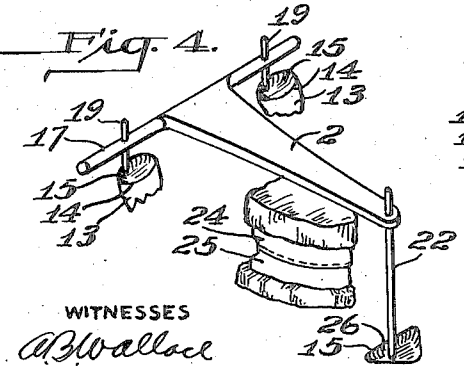
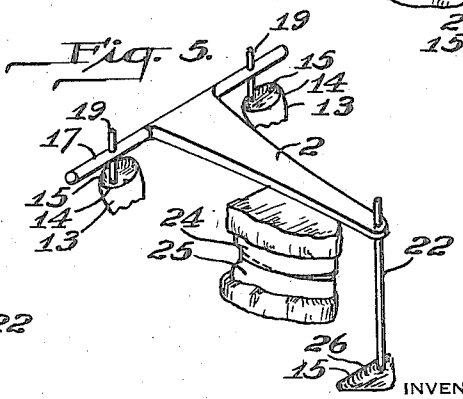


Fig. 5.



WITNESSES

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APPARATUS FOR MAKING ARTIFICIAL DENTURES

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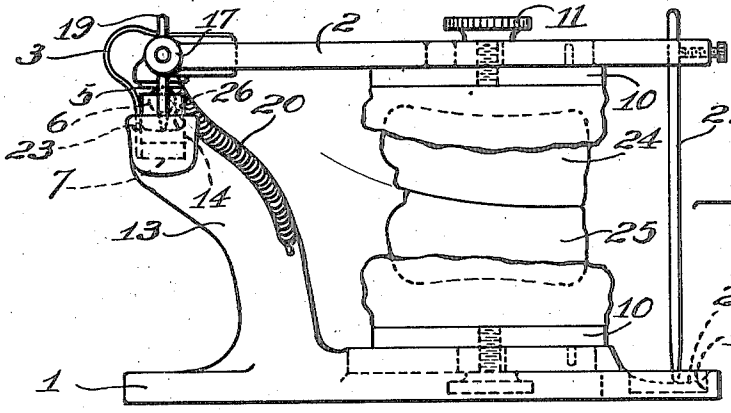


Fig. 6.

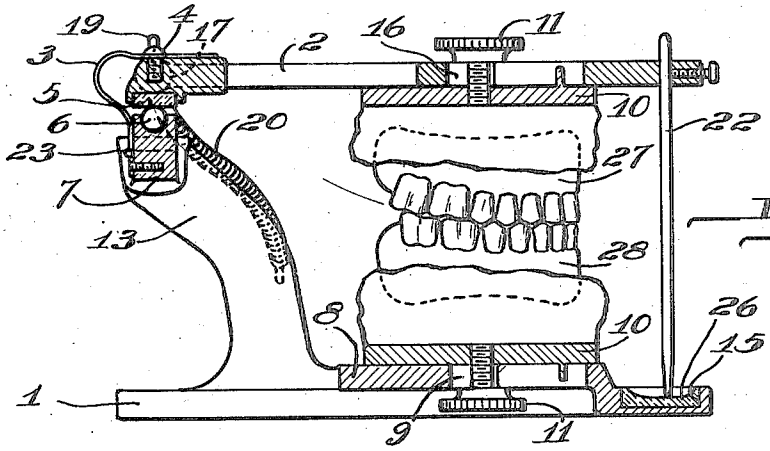


Fig. 7.

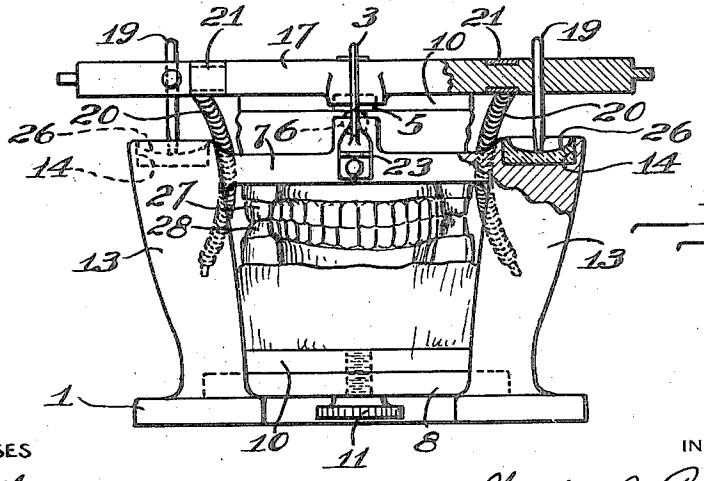


Fig. 8.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR MAKING ARTIFICIAL DENTURES

Charles A. Reith, Pittsburgh, Pa.

Application October 7, 1933, Serial No. 692,611

5 Claims. (Cl. 32—32)

My invention relates to apparatus for and methods of forming artificial dentures.

In the formation of artificial dentures, commonly known as "false teeth", it has generally been the practice to first take upper and lower impressions of a patient's mouth. From these impressions casts were made and on these casts were built up temporary plates of wax or other suitable plastic composition capable of receiving impressions. These wax plates were then placed in the patient's mouth and the patient made normal registrations in three positions of the lower jaw.

One of these positions has been the regular rest position or the neutral or normal position of the jaw. Another position was that of the jaw at the extreme right, while a third was at the extreme left position of the jaw. The temporary plates, with the registrations thereon, were then removed from the mouth and placed in one of several forms of instruments, known as articulators, which are capable of being adjusted to permit relative movements of the temporary plates between the three registrations taken on the temporary plates.

In articulators of the type heretofore known the temporary plate corresponding to the lower jaw has been mounted upon a stationary base plate while the plate corresponding to the upper jaw has been mounted upon an upper pivoted lever which represents the upper jaw but which for convenience has been made the movable member. Depending upon the particular type or form of articulator employed, this upper lever is constructed to be adjusted to each of the three registrations. Movement of the lever between these registrations is permitted.

Such instruments have always been constructed to permit relative movements of the lever and base in substantially straight lines between the three registrations. Inasmuch as these instruments have been made of metal and of rigid construction substantially no variation from these straight-line movements has been permitted and it will be appreciated therefore that such rectilinear movements of the instruments do not permit the temporary plates to simulate natural relative movements of the patient's jaw which may be and usually are along curved lines. Accordingly, when teeth have been placed in permanent plates in positions dependent upon the movements of the articulator between the three positions for which it has been adjusted, there is no assurance that normal movements of the jaw to positions other than those for which the instrument has been adjusted will be permitted with the freedom from interference that is essential to the satisfactory use of artificial dentures.

The lower jaw, or mandible, has joints of the ball-and-socket type that are individual to each person. At the upper rear of each side of the lower jaw is a condyle or ball portion that is movable within a socket in the upper jaw known as the glenoid cavity. Neither the condyles nor the glenoid cavities have spherical surfaces but they are elongated and of multiple curves. Accordingly, in order to reproduce positions of the teeth in artificial dentures that will permit the jaw to assume these various positions by means of movements in curved lines of which the jaw is capable, it is necessary to simulate the movements of the jaw in curved lines or paths in substantially any desired direction rather than limit such movement to straight lines between a relatively small number of points.

It is an object of the present invention to provide apparatus by means of which the jaw of a person may record the curved lines of its movements and by means of which these movements may be reproduced in order to adjust teeth in artificial dentures in positions that will permit the normal movements of the jaw of the patient without interference.

Another object of my invention is to provide a method of operation whereby normal movements of the jaw of the patient in many curved paths may be recorded and reproduced and permanent plates may be formed along lines that will freely permit all of the normal movements of the jaw of the patient from one position to any other position along curved lines.

In accordance with the present invention, I provide temporary plates, the engaging surfaces of which are ground by movements of the jaw of the patient to assume contours caused by the movement of the jaw from various positions to various other positions along curved lines. These contours will not necessarily be symmetrical but they will conform to the individual movements of the jaw of the patient. The temporary plates thus formed in accordance with the movements of the patient's jaw are placed in an instrument constructed in accordance with my invention and which will permit substantially unrestricted movements of the temporary plates in many curved paths as the plates are moved over each other and the paths are determined by the contours on the mutually engaging surfaces. The result of these movements is to reproduce movements typical of those of the jaw that produced

the contours on the adjacent surfaces of the temporary plates.

The reproduced movements of the jaw are recorded by means of suitable plastic material acted upon by members connected to the movable plate, and after surfaces are formed thereon as a result of movements along many curved lines, the plastic material is allowed to harden and thus form a permanent record from which similar movements may be produced in adjusting the teeth in the permanent plates.

Permanent base plates are then placed in the same instrument and the movable plate is caused to move along various curved lines that are determined by using the curved surfaces of the recording material as guides and the teeth in the permanent base plates are adjusted to such position that the various movements of the jaw may occur without interference.

The artificial dentures formed by the method described above, and by means of the apparatus of my invention, will be adapted to the peculiar formation of the jaw and its joints, and the movements permitted thereby and will have substantially perfect balance. Such balance has not been possible with any degree of accuracy heretofore and if it has been secured it has been generally a matter of accident or rough approximation rather than as the result of accurate methods by means of which it is substantially always assured.

The details of my invention will be described in connection with the accompanying drawings, in which Fig. 1 is a plan view of apparatus constructed in accordance with my invention for carrying out the method of operation broadly outlined above. Figs. 2, 3, 4 and 5 are diagrammatic views in perspective showing various relative positions of the parts of the apparatus of Fig. 1. Fig. 6 is a view in side elevation of the apparatus of Fig. 1 with temporary plates in position therein. Fig. 7 is a view in vertical longitudinal section taken on line VII—VII of Fig. 1, permanent plates being shown in position therein. Fig. 8 is a view partially in rear elevation and partially in vertical transverse section of the apparatus of Fig. 7.

Referring to the drawings, apparatus constructed in accordance with my invention comprises a stationary member 1 and an upper movably mounted lever 2 that is yieldingly connected to the stationary member 1 at its substantially central rear portion by means of a relatively light spring 3. The spring 3 is loosely connected to lever 2 by a screw 4 to permit pivotal and lateral movements of the lever. The lever 2 is provided immediately below the screw 4 with a cushion or mat 5 of sponge rubber or other suitable elastic material which rests upon a steel ball 6 that is mounted upon a cross bar 7 of the stationary member.

The stationary member 1 is of substantially triangular shape and of approximately the size of the average lower jaw. The base portion comprises a longitudinally extending member 8 that is slotted at 9 to permit securing thereto a frame or model holder 10 of skeleton formation to which temporary or permanent base plates may be secured by plaster in the usual way, the member 10 being secured to the member 8 by means of a suitable thumb screw 11 which extends through the slot 9. At the rear of the stationary portion 1 are two upwardly and rearwardly extending members 13 each of which corresponds in general shape and outline to a ramus or rear portion of the lower jaw. Each of the members 13 is provided at its upper end with a pocket or recess 14 for a purpose to be hereinafter described. The cross bar 7 is secured to or constructed integral with the substantially upright members 13. At the forward end of the base 1 is a recess or anterior occlusal plane cup 15, the purpose of which will be later described.

The lever 2 is slotted at 16 to provide for securing an upper model holder 10 thereon by means of a thumb screw 11. At the rear of the lever 2 is a rod 17 extending transversely thereof and having vertical posterior pins 19 extending therethrough and the lower ends of which project into the recesses 14. The lever 2 is yieldingly retained in a substantially horizontal position by means of two relatively light coil springs 20 that are secured to an intermediate portion of the members 13 and at the other ends are secured to collars 21 extending around the rod 17.

The ends of the rod 17 are adapted for the attaching of suitable instruments or apparatus for insuring proper distances between the joints of the jaw of the patient and the plates that are secured within the instrument. At the forward end of the lever 2 is a relatively long anterior pin 22, which projects downwardly into the recess 15. The pins 19 and 22 are known as tracing and guide pins.

From the foregoing description of the details of construction of the apparatus it will be apparent that the lever 2 is freely movable with respect to the stationary member 1 in substantially any desired number of curved lines or paths since it is connected to the stationary member 1 by means of relatively light springs and rests thereon at a single point constituted by the bearing ball but is relatively movable toward and from the latter by reason of the provision of the mat 5 of rubber or other elastic material. In addition, the spring 3 is hinged at 23 to permit the opening of the lever 2 during the use of the instrument.

In the formation of artificial dentures in accordance with my invention, I first make impressions of the patient's mouth from which temporary plates are formed, these consisting usually of a shellac base upon which is placed a curved wall or rim of wax or other suitable composition having thereon a layer of a gritty substance which may be, for example, a mixture of wax, plaster and carborundum. This layer of gritty or abrasive material may vary in thickness from three millimeters to one-quarter inch and extends to approximately tooth height. If desired the temporary plates may consist of a shellac base plate and the plastic abrasive material of suitable height without any intermediate portion of wax.

These temporary plates, with the abrasive plastic material having mutually engaging surfaces at the approximate dividing lines of the upper and lower teeth, are placed in the patient's mouth and the latter is then asked to move the lower jaw in various directions, such as from the extreme right to the extreme left, and forwardly and rearwardly. The patient is also instructed during all of these various movements to press the plates together in such manner as to grind the materials together and thereby produce contours on the mutually engaging surfaces that are the result of the various excursions of the jaw in many curved paths extending in various directions.

In view of the individual character of the jaw of the patient and the shape of the joints, the contours formed on the temporary plates will differ for each person and when placed in the

apparatus shown and described herein will permit the reproduction of the various movements of the jaw along many curved paths identical with or typical of those that produced the contours. The temporary plates 24 and 25, with the surfaces thus provided thereon, are then placed in the apparatus as illustrated in Fig. 6.

Suitable plastic material, indicated at 26, that is capable of hardening to form a substantially hard, rigid mass, is placed in the pockets or recesses 14 and 15. An example of a suitable material for this purpose is silver amalgam which is very plastic initially and which gradually forms a very hard, rigid material. Cement is also suitable.

The lever 2 with the upper plate 24 is then moved in various directions along curved lines or paths such as are determined by using as guides the contours of the engaging surfaces of the temporary plates. These movements cause the pins 19 and 22, which have their lower ends shaped in the form of a blunt chisel, to shape the surfaces of the material in the pockets in accordance with the movements of the pins. These surfaces will be shaped to represent the resultants of the movements along curved paths in accordance with the movements of the temporary plates over each other.

While it is possible to develop the recording surfaces in all of the cups 14 and 15 simultaneously the recommended and preferred technique is to first fill the forward pocket 15 with impression-receiving material, and then after setting the pin 22 in its proper recording position impart to the upper plate support 2 the necessary movements, controlled by the molds, to develop the desired record in the forward pocket. After this is completed the impression-receiving material in pocket 15 is permitted to harden. As soon as this takes place one or the other of the rear pockets 14 is filled with impression-receiving material, its associated pin 19 set in operative position, and the upper plate support 2 once more put through its movements, the forward pin 22 being kept in its operative position during such procedure. Like in the first step in the process after the first rear cup impression is developed, the plastic material therein is permitted to harden. Next the remaining rear cup is worked in in the same manner. By such method of operation most exceptionally satisfactory results have been obtained.

The degree to which the lever 2 is movable with respect to the stationary member 1 is diagrammatically shown in Figs. 2, 3, 4 and 5. These views are representative of various positions relative to the stationary member 1 whether the plates therein are temporary or permanent base plates. It will be noted that in Fig. 2 the pins 19 and 22 are in approximately central positions with respect to the pockets 14 and 15 which will ordinarily correspond to the rest position or neutral position of the jaw. Fig. 3 illustrates approximately the extreme forward position of the lower jaw. In Fig. 4 the jaw is shown in its extreme right-hand position. In Fig. 5 the lower jaw is in a position in which the front of the jaw is moved to an extreme position to the left. The spring 3 which is relatively light and is loosely secured to the lever 2 permits pivotal and lateral movements of the latter relative to the base.

When a sufficient number of movements in various directions have occurred to cause the records constituted by the surfaces of the material in the pockets to be sufficiently complete the plastic material 26 may be allowed to harden and the temporary plates are removed.

Permanent base plates 27 and 28 of the usual character are then secured in position on the stationary member 1, as illustrated in Figs. 7 and 8, and the lever 2 and the process of setting and adjusting the teeth in proper position is then begun. The various positions of the lever 2, including those illustrated in Figs. 2, 3, 4 and 5, are determined by the engagement of the ends of the pins 19 and 22 with the curved surfaces of the hardened material 26 in the pockets 14 and 15 whereby the lever 2, in any position permitted thereby, corresponds to a similar position of the jaw in forming the contours of the temporary plates by means of which the curved recording surfaces were secured. In other words, the lever 2 may now be caused to assume various positions by moving it along any desired number of curved paths determined by engagement of the pins with the recording surfaces and the movements will substantially conform to those of the natural or normal movements of the jaws of the patient.

The teeth in the permanent plates will be adjusted to accommodate or permit the various movements of the lever 2 and will accordingly be in such position as not to interfere with the normal movements of the jaw and will at the same time have such degree of perfect balance as to cause their use by the patient to be attended with extremely little discomfort that might otherwise be caused by improper positions of the teeth in the various parts of the plates, which would cause them to interfere with normal movements of the jaw from one position to another.

It will be noted from the foregoing that I have provided apparatus and methods that may be employed in the forming of artificial dentures of such configuration and movable to such relative positions as to permit the unrestricted normal movements of the jaw from any of its positions to any other positions. Instead of employing apparatus and methods involving the movement of plates in straight lines from one position to relatively few other positions, I have provided that all of the various movements of the jaw along curved paths may be recorded and reproduced to the extent that is necessary to permit the formation of artificial dentures which freely permit the normal movements of the jaw.

Stated in other words, the multiple curvilinear movements of the jaw of the patient with the peculiarities incident to the shapes of the joints and other individual characteristics are recorded and reproduced in such manner that these multiple curvilinear movements may be made by the patient without interference by the teeth of the artificial dentures.

The foregoing and other advantages will be apparent to those skilled in the art of dentistry.

I claim:

1. Apparatus for forming artificial dentures, comprising a stationary base member adapted to support a temporary dental plate, a lever member disposed above said base and adapted to support a temporary dental plate for registering with said first-mentioned plate, one of said members being provided with a socket, a ball disposed in the socket and spacing said members apart, spring means yieldingly connecting said members whereby said lever member is movable in all directions relative to said base member, and means attached to said members for recording the movements of said lever member relative to the base member.

2. Apparatus for forming artificial dentures, comprising a stationary base member adapted to support a temporary dental plate, a lever member disposed above said base and adapted to support a temporary dental plate for registering with said first-mentioned plate, one of said members being provided with a socket, a ball disposed in the socket, a resilient cushion disposed between the other of said members and said ball, spring means yieldingly connecting said members whereby said lever member is movable in all directions relative to said base member, and means attached to said members for recording the movements of said lever member relative to the base member.

3. Apparatus for forming artificial dentures, comprising a stationary base member adapted to support a temporary dental plate, an upper plate-supporting member disposed above said base and adapted to support a temporary dental plate for registering with said first-mentioned plate, a support for said upper plate-supporting member at one end of said base, means yieldably connecting one end of said member to said support, a ball adapted to form a pivotal rest for said member disposed in a socket between the top of said support and said member and on the center line thereof, and triangularly disposed symmetrically arranged cooperating means carried by said base and upper plate-supporting member for recording the movements of said member.

4. An apparatus according to claim 3 provided with means in alignment with said ball and socket for yieldably connecting said support to said upper plate-supporting member.

5. An apparatus according to claim 3 in which said recording means comprise a pair of receptacles carried by said support on equal sides of the center line thereof, a similar receptacle at the forward end of said base in alignment with said ball and socket and a stylus for each of said receptacles adjustably mounted in said upper plate support in registration therewith.

CHARLES A. REITH.