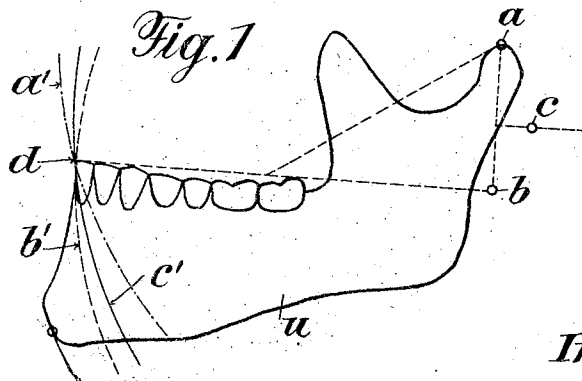
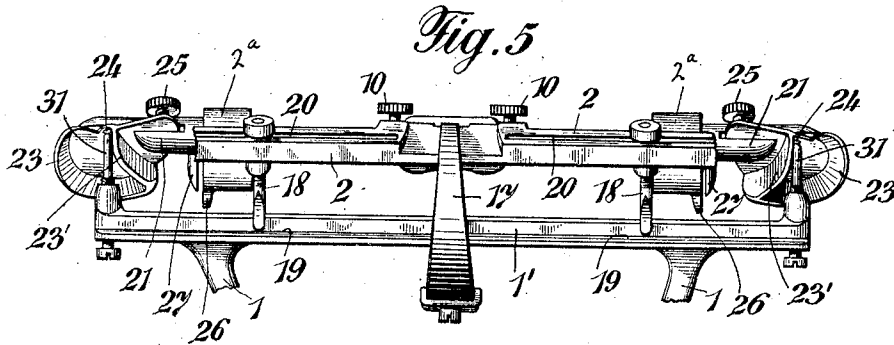
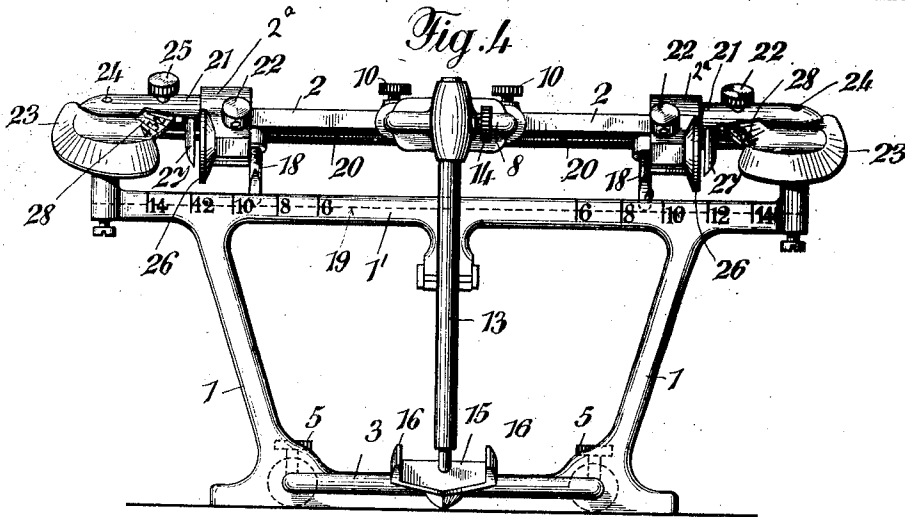


A. GYSI.
DENTAL ARTICULATOR.
APPLICATION FILED MAY 23, 1911.

1,041,270.

Patented Oct. 15, 1912.

3 SHEETS-SHEET 1.



Witnesses:

B. Kommers
Elizabeth Leckert

Inventor:

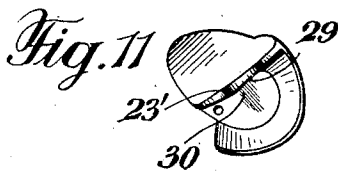
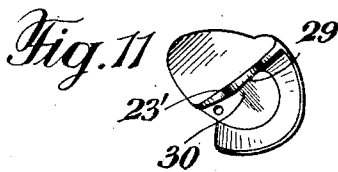
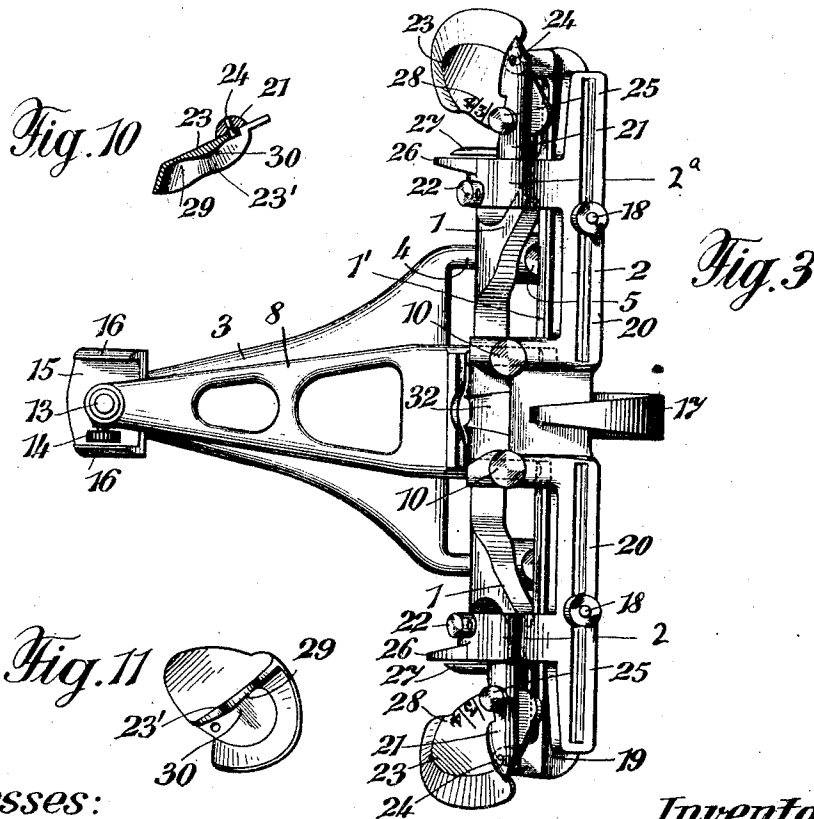
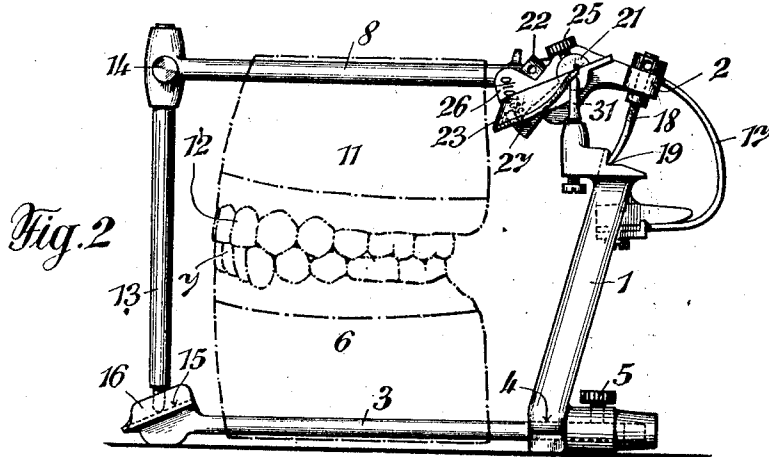
Alfred Gysi
By Henry Orth atty.

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3 SHEETS—SHEET 2.



Witnesses:

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Elizabeth Leckert

Inventor:

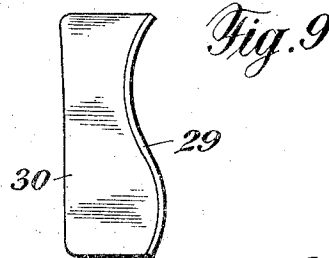
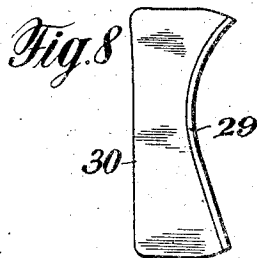
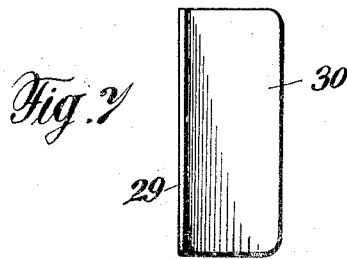
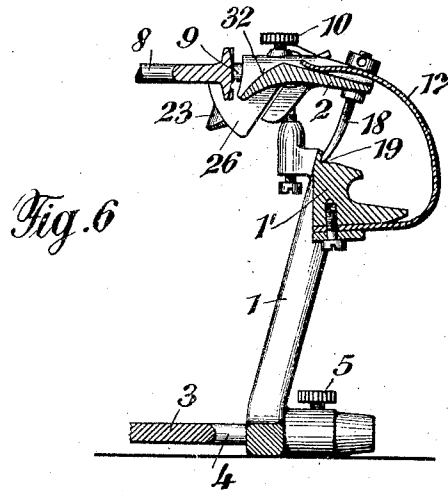
Alfred Gysi.
By Henry Orth atty

A. GYSL.
DENTAL ARTICULATOR.
APPLICATION FILED MAY 23, 1911.

1,041,270.

Patented Oct. 15, 1912.

3 SHEETS—SHEET 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

ALFRED GYSI, OF ZÜRICH, SWITZERLAND.

DENTAL ARTICULATOR.

1,041,270.

Specification of Letters Patent.

Patented Oct. 15, 1912.

Application filed May 23, 1911. Serial No. 628,986.

To all whom it may concern:

Be it known that I, ALFRED GYSI, professor, a citizen of the Republic of Switzerland, residing at Obere Zäune 10, Zürich, Switzerland, have invented new and useful Improvements in or Relating to Dental Articulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to an apparatus (hereinafter referred to as an articulator), for the use of dentists, by means of which the hinge movements of rows of artificial teeth for the upper and lower jaws, can be reproduced and determined. Articulators of this kind that are known to me have two parts adjustable relatively to each other, situated one above the other, the upper one of which is pivoted or hinged to the lower one. To one part is secured the row of teeth intended for the lower jaw, and to the other part, the row of teeth intended for the upper jaw. In order to enable these two rows of teeth to be moved in the natural grinding movement relatively to each other, the upper part of the articulator, in some of such well known articulators, is adjustable on horizontal fixed guides arranged at a right angle to the axis of the hinge or joint. In other constructions, on the contrary, the same is adjustable on oblique fixed guides which however are also arranged at a right angle to the axis of the joint. In such known constructions the pivotal movements of the upper and lower series of teeth can not be adapted to suit the individual conditions of jaw and joint. In order to attain the latter object, articulators have been designed in which the upper part of the articulator is adjustable by means of pivot pins in straight guides which can be moved. For the same purpose articulators have been designed in which the upper part of the articulator is adjustable by means of pivot pins in fixed curved guides. In this last described construction, the curved guides are provided on interchangeable plates (slotted plates) and the shape of the curves is obtained by means of a recording apparatus

which reproduces the individual grinding movement of the lower jaw. But even the last two described constructions do not accomplish the object of the present invention, more particularly in that it was impossible to reproduce exactly the pivotal movements of the upper part of the articulator corresponding to the lateral masticating movements. This is due to the fact that in the said articulators, the straight and adjustable guides, or slotted plates, used, control the adjustable upper part of the articulator chiefly only in the vertical direction, but not also in lateral direction.

In the construction according to this invention, the above drawback is sought to be remedied, and it is consequently possible to adapt, with the articulator, in case when all the teeth are artificial the pivotal movements of the artificial rows of teeth, to any possible individual conditions of jaw and joint, in the most accurate manner, this being effected by providing one part of the articulator with two guide parts, each of which is provided with two curved surfaces arranged at an angle to each other and coöperating with two guide pins of the other part of the articulator in such manner that when the adjustable part of the articulator is operated it will be controlled by the curved surfaces of each guide piece simultaneously in a horizontal forward, horizontal inward and in a vertical direction that is in a direction which lies between these three directions.

Another novel feature of the articulator according to this invention, is that the axis of the joint for the upper part of the articulator occupies a more favorable position as regards the height, than in the case of articulators at present known and mentioned in the beginning. For some of them, it has been assumed that the hinge points of the lower jaw *a*, as shown in Figure 1 of the drawing, are situated at the upper end of the rearmost part of the jaw, at *a*, and for others, the assumption was made that the hinge points were situated on the level of *b*, and the pivot pins or articulators were therefore placed at the corresponding level. In the former case, that is to say, in case of the rotation of the lower jaw about the points *a*, the front cutting tooth edge *d* of the jaw will be moved in the direction of the arc of circle *a'*, and in the second case, that is to say, in the case of rotation of the

lower jaw about the points *b*, it will be moved on the contrary in the direction of the arc of circle *b'*. Neither of these two movements is however suitable for obtaining a natural grinding movement of the upper and lower rows of teeth. Careful observations seem to prove that the real hinge points of the lower jaw are not situated either on the level of *a* or of *b*, but on the level of *c* (Fig. 1), that is to say, about in the middle between *a* and *b* but behind the vertical line passing through the points *a* and *b*. The axis of the joint in the present articulator is accordingly shifted to the upper part of the articulator, to the level of *c*. This results in the foremost cutting tooth edge *d* describing the arc of circle *c'* situated between the arcs of circle *a'* and *b'*, whereby the closest possible imitation of the natural grinding motion is obtained.

A construction according to this invention is illustrated, by way of example in the accompanying drawing in which—

Fig. 2 shows the articulator in side elevation, Fig. 3 in plan, Fig. 4 in front elevation, while Fig. 5 is a partial rear view and Fig. 6 a cross-section through the articulator. Figs. 7-11 show parts of the articulator, partly diagrammatically.

The articulator illustrated comprises a well known form of a fixed substantially upright lower part 1 and of a movable upper part 2. On the lower part of the articulator is mounted, in an adjustable manner by means of pins 4, an arm 3 which forms a foot capable of being fixed by means of set screws 5 acting on the pin. To the said arm 3 can be secured by means of gypsum 6 (Fig. 2), the row of teeth 7 intended for the lower jaw. On the upper part of the articulator is also mounted adjustably by means of pins 9 (Fig. 6), an arm 8 which projects in the same direction as the arm 3. This arm 8 can also be fixed by means of set screws 10 acting on the pins, and the row of teeth 12 intended for the upper jaw, can be secured to said arm by means of gypsum 11 (Fig. 2). The arm 8 is provided at its front end with an adjustable pin 13 directed vertically downward and capable of being fixed by means of a set screw 14. The pin 13 is guided at the bottom by a cam face 15 provided at the front end of the arm and provided with lateral flanges 16 (Figs. 2-4). The upper part 2 is pivoted on a cross-piece 1' (Fig. 6) of the part 1 by means of supporting pins 18 which rest in a longitudinal groove 19 formed in the cross-piece 1', said pins are pressed into the groove by a spring blade 17 which is fixed at one end to the underside of the cross-piece 1', and has its free end pressing on top of the upper part 2. The longitudinal groove forms the axis of the joint about which the upper part of

the articulator can be turned during the vertical masticating motion, and is situated on a level with the point *c* in Fig. 1. The supporting pins 18 are adjustable in slots 20 (Figs. 3 and 5) formed in the part 2 and can be fixed in adjusted position by means of nuts on the pins. These pins form the proper centers of turning or tipping about which the part 2 of the articulator can be turned during the lateral masticating movements. The cross-piece 1' is provided with a scale (Fig. 4) for indicating the proper adjustment of the pins 18 when two or more complete sets of teeth are to be manufactured simultaneously.

On the front of the part 2 near each end thereof is formed a split bearing 2^a (Figs. 3, 4, and 5) in each of which is mounted an arm 21 bifurcated at one end and extending parallel to the slot 20. These arms are adjustable in the bearings and are clamped in position therein by bolts 22 with their bifurcated ends extending in opposite directions to each other. In each bifurcated arm a guide part 23 is mounted interchangeably and rotatably about a pin 24, and so that it can be fixed by means of a set screw 25 (Figs. 2-6). For the exact adjustment of the bifurcated arms 21 relatively to the upper part 2, and for the adjustment of the guide parts 23 relatively to the bifurcated arms, there are provided on the split bearings two scales 26, and on the bifurcated arms, corresponding hands or indices 27, or scales 28 are provided on the guide parts (Figs. 2 and 3).

Each of the two plate-shaped guide parts 23 is provided on its lower surface with a rib 23' (Figs. 5, 10 and 11) at a right angle to the same. The outward side 29 of the said rib, and the portion 30 of the lower side of the guide part, situated at a right angle to the said side, are formed into cam or curved surfaces (Figs. 10 and 11). These curved surfaces 29 and 30 can have the shapes shown in Figs. 7-9, that is to say, either the surface 29 can be straight, as shown in Fig. 7, and the corresponding surface 30 have the shape of the surface 29 in Figs. 8 or 9, or the converse can be the case. The upper part 2 of the articulator is pressed by the action of the spring 17, with the guide parts 23 against two vertical guide pins 31 secured to the cross-piece 1' of the articulator, namely in such manner that each guide part rests with the surface 30 from the top, and with the surface 29 from the side, against the corresponding pin 31. The guide parts 23 and the guide pins 31 form the joints for the lateral movements of the upper part 2 of the articulator; these movements are independent of the vertical pivotal movements proper, which can be effected with the upper part of the articulator by means of the supporting pins 18 and of

the spring 17. In the upper part of the articulator there is further provided a recess 32 (Figs. 3 and 6) for the spring 17, with which the latter engages when the upper part 2 is tipped back. The bottom of the said recess is curved in an arc of a circle, the center of which is situated in the groove 19 (Fig. 6) or in the point *c* (Fig. 1). The spring blade 17 engages with that surface, on the upper part 2 being tipped and thus holds the upper part in the position given to it. The shape of the curved surfaces 29 and 30 of the guide parts 23 corresponding to the path of the pivotal movements of the lower jaw, is determined by the measurement of the movements of the lower jaw on the patient by means of a measuring instrument, the so called recorder. The manner in which it is done, will not be more fully described here, as it is well known. To make a whole set of teeth, first of all guide parts 23 with curved surfaces corresponding to the jaw movement paths, obtained by measurement on the patient, are inserted into the bifurcated arms 21; and the latter and the guide parts 23 adjusted by means of the scales 26 and 28 to the inclinations ascertained. After having further set the supporting pins 18 to the corresponding distance, the upper part of the articulator is moved to and fro between the flanges 16 of the plate 14 or on the same by means of the supporting pin 13. The upper part of the articulator will then be alternately tipped about the bottom end of one and of the other supporting pin 18 as a center of rotation, and owing to the curved surfaces 29 and 30 of the appertaining guide part 23, pressed by the spring 17 against the corresponding pin 31, the upper part 2 will be reciprocated vertically and horizontally forward and inward, the curved surfaces 29 controlling the upper part in the lateral that is in the horizontal inward direction and the surfaces 30 in the vertical and in the horizontal forward direction. These movements of the upper part 2 or of the row the teeth secured to the arm 8 of the same relatively to the bottom row of teeth, correspond then, as they have been adapted to the jaw and joint conditions of a patient, in the most accurate manner to the masticating movements which the patient makes with his lower jaw.

The guide parts 23 could also be provided on the lower part 1, and the pins 31 on the upper part, of the articulator. In articulators for normal sets of teeth the guide parts may be immovably connected to the corresponding part of the articulator.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. In an articulator for dentists, a fixed

and a movable part, means yieldingly connecting said parts, two guide pieces connected to one of said parts, each of said guide pieces having two curved surfaces arranged at an angle to each other, two pins connected to the other one of said parts and engaging said surfaces, said movable part when operated being actuated by the curved surfaces of each guide piece simultaneously in a horizontal forward, a horizontal inward and in a vertical downward direction; that is in a direction which lies between these three directions, substantially as described.

2. In an articulator for dentists, a fixed and a movable part, a spring securing said movable part to said fixed part, two guide pieces connected to one of said parts having two curved surfaces arranged at an angle to each other, two guide pins connected to the other one of said parts and engaging said curved surfaces, substantially as described.

3. In an articulator for dentists, a fixed and a movable part, a plate-spring secured to the fixed part engaging with its free end over the movable part and holding the latter in the position tipped backward, two guide pieces connected to one of said parts having two curved surfaces arranged at an angle to each other, two guide pins connected to the other one of said parts and engaging said curved surfaces, substantially as described.

4. In an articulator for dentists, a fixed and a movable part, means yieldingly connecting the parts, two guide pieces connected to one of said parts having two curved surfaces arranged at an angle to each other, two guide pins connected to the other one of said parts and engaging said curved surfaces, the axis of the vertical movement of the movable part being between the top of the articulator and behind a vertical plane passing through the guide pins.

5. In an articulator for dentists, a fixed and a movable part, a plate-spring secured to the fixed part and engaging the movable part, two guide pieces connected to one of said parts having two curved surfaces arranged at an angle to each other, two guide pins connected to one of said parts and engaging said curved surfaces, the axis of the vertical movement of the movable part being situated between the top of the guide pins and the horizontal middle plane of the articulator and behind the vertical plane passing through the guide pins.

6. In an articulator for dentists, a fixed and a movable part, means yieldingly connecting the parts, two axles connected to one of said parts, two guide pieces rotatable around said axles and having two curved surfaces arranged at an angle to each other, means to fix said guide pieces, two guide

pins connected to the other one of said parts and engaging said curved surfaces, substantially as described.

7. In an articulator for dentists, a fixed
5 and a movable part, means for yieldingly
connecting said parts, interchangeable guide
pieces adapted to be adjustably mounted in
one of said parts and having curved sur-
faces arranged at an angle to each other,
10 and two guide pins connected to the other
one of said parts and engaging said curved
surfaces.

8. In an articulator for dentists, a fixed
and a movable part, means yieldingly con-
15 necting the parts, two bifurcated arms, ro-
tatable in one of said parts, two axles per-

pendicular to and supported by said bifur-
cated arms, two guide pieces rotatable
around said axles and having curved sur-
faces arranged at an angle to each other, 20
means to fix said guide pieces, two guide
pins connected to the other one of said parts
and engaging said curved surfaces, substan-
tially as described.

In testimony that I claim the foregoing as 25
my invention, I have signed my name in
presence of two subscribing witnesses.

ALFRED GYSL.

Witnesses:

AUGUST RÜEGG,

JULIUS P. HEINS.