R. L. HANAU.

DENTAL SURVEYING APPARATUS.

APPLICATION FILED APR. 19, 1915.

1,230,156.

Patented June 19, 1917.

2 SHEETS—SHEET 1.

Fig. 2.

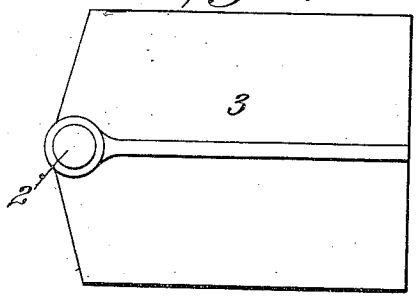


Fig. 7.

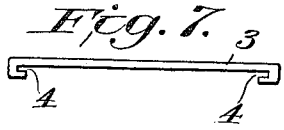
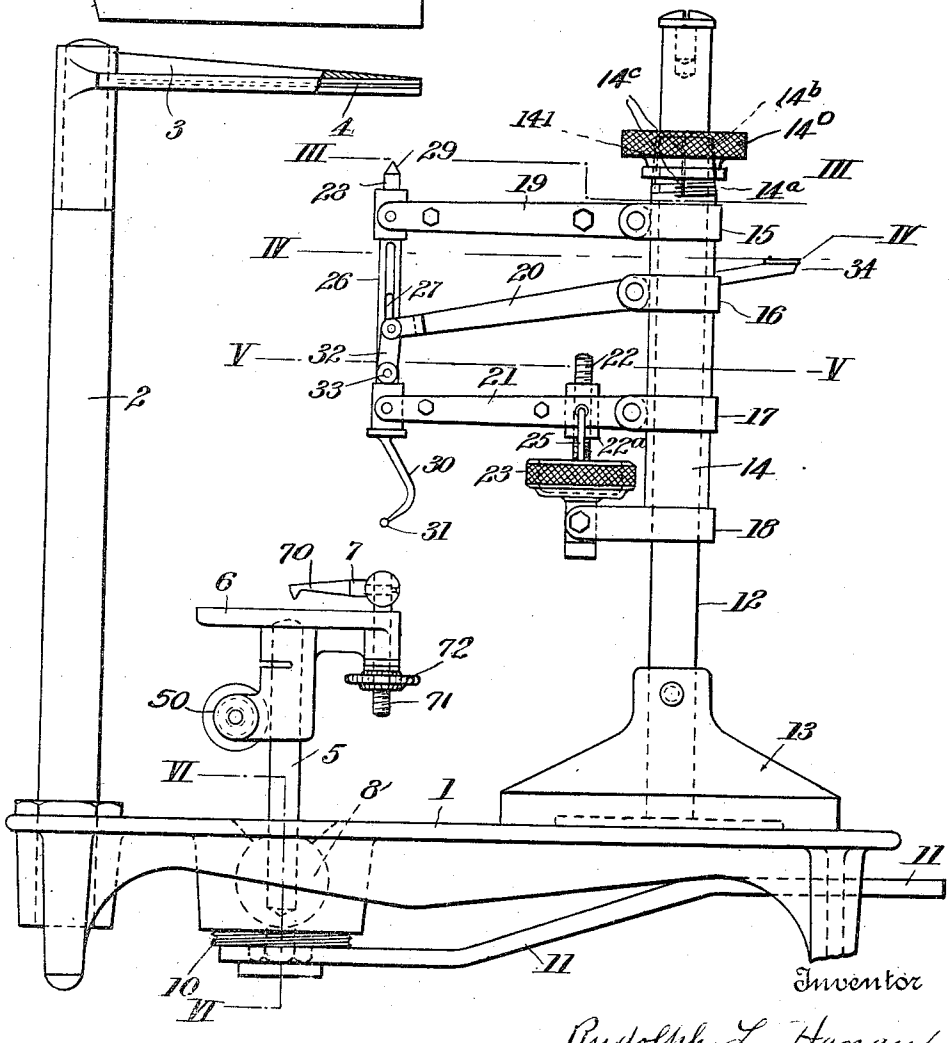


Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 3.

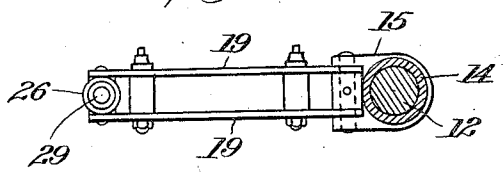


Fig. 4

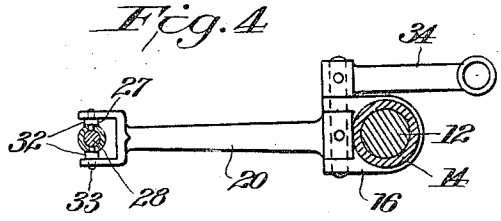


Fig. 5.

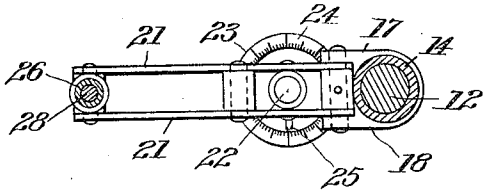
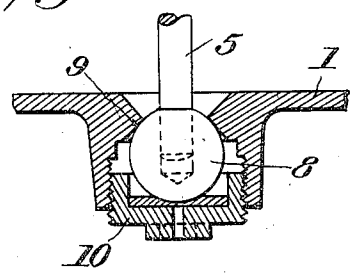


Fig. 6.



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UNITED STATES PATENT OFFICE.

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DENTAL SURVEYING APPARATUS.

1,230,156. Specification of Letters Patent. Patented June 19, 1917.

Application filed April 19, 1915. Serial No. 22,429.

To all whom it may concern:

Be it known that I, RUDOLPH L. HANAU, a subject of the King of England, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Dental Surveying Apparatus, of which the following is a full, clear, and exact specification.

This invention relates to an apparatus for making a survey in three dimensions of the teeth and adjacent structures from plaster casts, and to aid in obtaining the exact position of teeth to be regulated. This apparatus is designed to be used for studying normal and pathological developments, and it may be employed advantageously by orthodontists to obtain the positions of teeth in malocclusion, and the contour lines of palate asymmetry, in order to determine the best and easiest way to establish normal occlusion of the teeth and symmetry of adjacent structures. Another object is to provide simple and inexpensive means or apparatus for the purposes mentioned, which apparatus may be easily operated, is accurate and will not readily get out of order.

The invention will be first hereinafter described in connection with the accompanying drawings, which constitute a part of this application, and then more specifically defined in the claims at the end of the description.

In the accompanying drawings, wherein similar reference characters are used to designate corresponding parts throughout the several views:—

Figure 1 is a side elevation of apparatus of the character described constructed substantially in accordance with this invention.

Fig. 2 is a top plan view of the plate for holding the paper on which the survey or plot is to be made.

Fig. 3 is a section on the line III—III of Fig. 1.

Fig. 4 is a section on the line IV—IV of Fig. 1.

Fig. 5 is a section on the line V—V of Fig. 1.

Fig. 6 is a section on the line VI—VI of Fig. 1, and

Fig. 7 is an end view of the plate shown in Fig. 2.

The apparatus is mounted on a platform 1 carrying at one side a rigid upright 2 bearing a horizontal plate 3 on its upper end. The under face of said plate is flat and its lateral edges are grooved, as at 4 in Fig. 1, to receive and retain a sheet of paper or cardboard (not shown) on which the survey or plot is made.

The platform 1 also carries an adjustable shorter upright 5 to the upper end of which a table 6 may be adjustably attached, if desired, by a suitable clamp 50 or the like. Said table is provided with a clamp 7 for securing the mold or cast to the table when the survey is being made. To this end, the clamp 7 has a horizontally extending arm 70 carried by a pin 71 passed through the table 6 and adapted to be vertically adjusted by the nut 72 fitted on the screw-threaded lower end of said pin and having swivel connection with the plate. The upright 5 is fastened at its lower end to a ball 8 which may be clamped in any desired position in a correspondingly shaped socket 9 in the platform by a screw cap 10 best shown in Figs. 1 and 6. This cap is fitted with a long operating handle 11 which extends beyond the edge of the table or platform 1 so that it may readily be moved in either direction for loosening or tightening the cap against the ball.

The platform 1 is further provided with standard 12 fitted in a base plate 13 which may be placed at any suitable point on the platform. The standard 12 carries an adjustable sleeve 14 having spaced straps or lugs 15, 16, 17 and 18. The sleeve 14 has its upper end portion screw-threaded as at 14^a, tapered as at 14^b, and longitudinally slotted as at 14^c, Fig. 1, and around this tapered end portion is fitted a clamping nut 140 having its screw-threaded bore correspondingly tapered as at 141, so that by screwing said nut down upon said tapered end of the sleeve, the latter may be clamped at any desired point on the standard. The upper three straps 15, 16 and 17 have pivotally secured thereto for swinging in a vertical

plane, levers or arms 19, 20 and 21, respectively, arms 19 and 21 being of the same length. The lowest strap 18 supports an inverted screw 22 having the upper face of its head 23 calibrated, as at 24, around its peripheral portion. The screw 22 extends up through a tapped sleeve 22ª pivoted on the arm 21, and said sleeve carries a depending pointer 25 which coöperates with the scale 24 to indicate the relative height of each point on the mold or cast touched by the knob 31 hereinafter described.

The arms 19 and 21 are pivotally connected at their outer ends to a sleeve 26, the pivots of said arms on said sleeve being the same distance apart as the pivots of the other ends of said arms through the straps 15 and 17, so that the four fulcra at the ends of the arms 19 and 21 are the corners of a parallelogram in whatever position or inclination the arms may be. The sleeve 26 is slotted at 27 and in said sleeve is loosely fitted a rod 28 which is pointed, as at 29 at its upper end. Sleeve 26 carries a bent depending indicator 30 at its lower end, said indicator being provided with a spherical knob 31 on its lower end to prevent it from scratching the casting or mold. The rod 28 is connected to the arm 20 by means of pivoted links 32 and a cross pin 33 passed through the slots 27 and the rod. Through these connections it is possible to raise and lower the rod 28 with the arm 20. Said arm is provided with an operating finger 34 extending at the opposite side of its pivot on the strap 16, so that it may be actuated without having to grasp said arm between the arms 19 and 21.

In operation, the screw 22 is turned for either raising or lowering the arms and sleeve 26 until the tip 31 comes into contact with a point on a casting or mold secured to the table 6 by the clamp 7. The elevation of said point may then be read on the scale 24, and the point located on the paper carried by the plate 3 by pressing down on the operating finger of the lever 20 which will move the rod 28 upward until its pointed upper end 29 strikes said paper, or papers with carbon sheets between, as may be used for making duplicates. In the same manner any number or all of the points on the casting or model may be plotted out or surveyed, the standard 12 with its base 13 being freely movable on the platform 1 to bring the knob 31 of the indicator in turn over each point on the casting or model to be surveyed. The altitude or elevation of each point is shown by the readings on the graduated wall 23.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. The combination with a supporting means for a sheet of paper, of means for holding an article to be surveyed, an indicator and means to support the same, means for vertically adjusting the indicator, whereby it may be brought into contact with a point on the article, and an axially movable member on said indicator for marking the point on the paper.

2. The combination with a supporting means for a sheet of paper, of means for holding an article to be surveyed, an indicator and means to support the same, means for vertically adjusting the indicator, whereby it may be brought into contact with a point on the article, means for indicating the altitude of said point, and an axially movable member on said indicator for marking the location of said point on the paper.

3. The combination with means for holding an article to be surveyed, of a swinging member, a support therefor, an indicator carried by the swinging member and adapted to be brought into contact with a point on the article, means for moving said swinging member to bring the indicator into contact with said point and means for indicating the relative altitude of the indicator in different vertical positions.

4. The combination with means for holding an article to be surveyed, of a standard, a pair of arms pivotally connected to said standard, an indicator, means for pivotally carrying the indicator at the outer ends of said arms whereby said indicator may be brought into contact with a point on the article, a screw carried by the standard and having threaded connection with one of the arms for moving the indicator into contact with said point, said screw having a scale thereon, and a pointer on the arm for coöperating with said scale for indicating the altitude of said point.

5. The combination with means for holding an article to be surveyed, of a standard, a pair of arms pivotally connected to the standard, a sleeve pivotally carried by the outer ends of said arms, an indicator on one end of said sleeve and adapted to be brought into contact with a point on the article, means for indicating the relative altitude of the indicator in different vertical positions, a plate for holding a sheet of paper above the article supporting means, and an axially movable rod fitted in said sleeve for marking said point on the paper.

6. The combination with means for holding an article to be surveyed, of a standard, a pair of arms pivotally connected to the standard, a sleeve pivotally carried by the outer ends of said arms, an indicator on said sleeve and adapted to be brought into contact with a point on the article, means for indicating the relative altitude of the indicator in different vertical positions, a

plate for holding a sheet of paper above the article supporting means, an axially movable rod fitted in said sleeve for marking said point on the paper, and another arm pivotally connected to the standard and operatively attached to said rod for moving the same longitudinally independenly of the sleeve.

In testimony whereof I have signed my name to this specification.

RUDOLPH L. HANAU.