

Dec. 14, 1948.

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DENTAL SURVEYING INSTRUMENT

2,456,447

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2 Sheets-Sheet 1

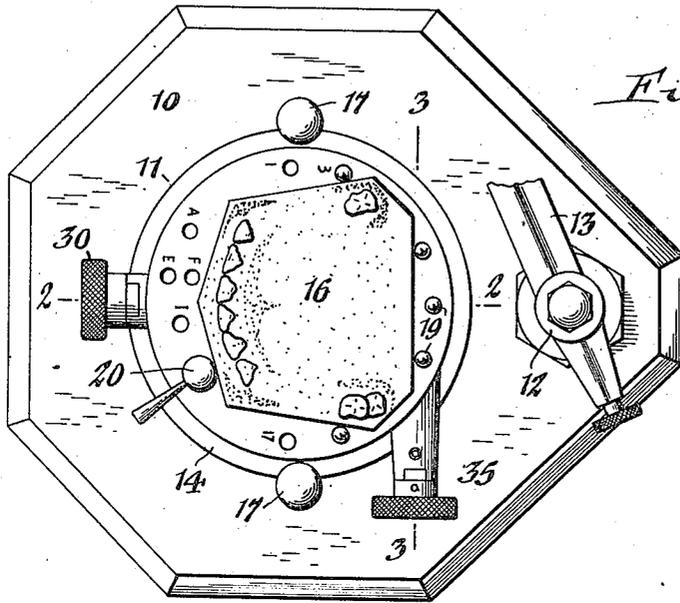


Fig. 1.

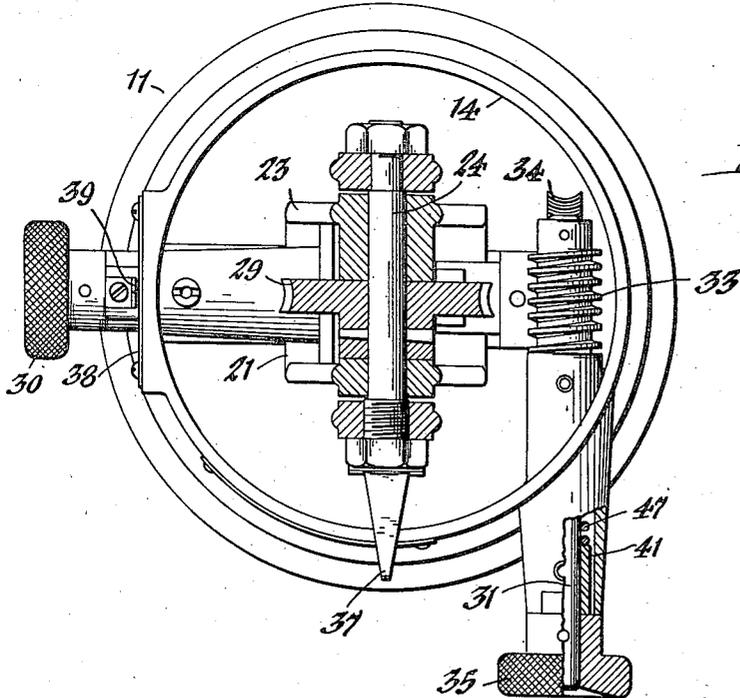


Fig. 4.

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Fig. 2.

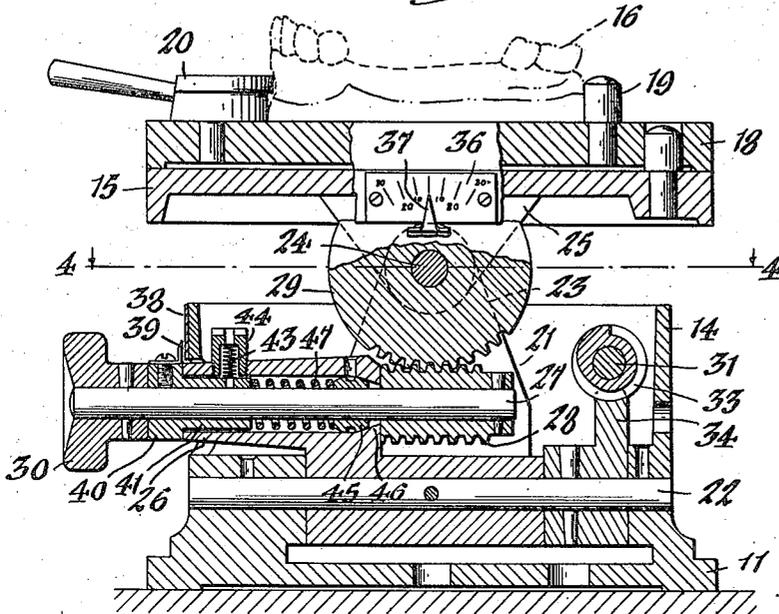
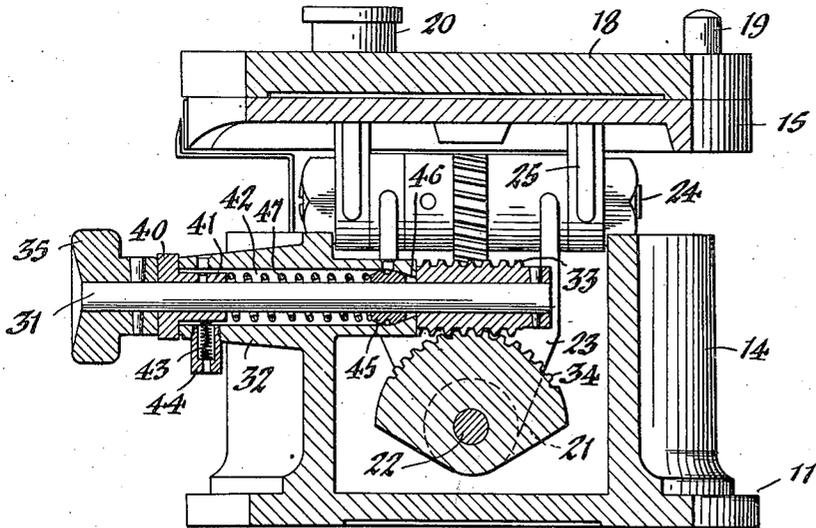


Fig. 3.



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UNITED STATES PATENT OFFICE

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DENTAL SURVEYING INSTRUMENT

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2 Claims. (Cl. 32-32)

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This invention relates to certain new and useful improvements in dental surveying instruments of the type shown in United States Patent No. 2,376,384, dated May 22, 1945.

One of its objects is to provide a dental instrument of this character having a universally-tiltable, model-supporting table having means for adjusting and indicating its degree of tilt in any direction, and to so mount the table and its actuating means as to effectually compensate for the gearing as well as for wear of the parts during use.

Other features of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a top plan view of the surveying instrument embodying our invention. Figures 2 and 3 are enlarged cross-sections thereof taken substantially in the planes of the correspondingly numbered lines in Figure 1. Figure 4 is a horizontal section taken substantially in the plane of line 4-4, Figure 2.

Similar characters of reference indicate corresponding parts throughout the several views.

The numeral 10 indicating the base or platform on which the various working parts of the surveyor are mounted, is smoothly machined in a horizontal plane on its top side to provide a support for the surveying mechanism, indicated generally by the numeral 11. Rising from this base at one side thereof is a post or standard 12 on which is mounted a vertically-jointed, tool-carrying arm 13 on which the various tools used in surveying dentures are adapted to be detachably mounted.

Mounted on the top side of the base 10 to be rotated thereon at will, or to be clamped in a fixed position thereto, is the casing 14 of the surveying mechanism which carries a universally-movable working table 15 for supporting the model 16 to be surveyed. Clamping screws 17 fitted into the base 10 and engaging the flanged bottom of the casing serve to detachably secure the latter to the base. The casing is cylindrical in shape and the working table 15 surmounts the same for tilting movement in any direction to the horizontal. By preference, a removable working plate 18 is applied to the top side of the table and the model 16 is anchored thereto. This working plate is centered and held against lateral displacement on the table by means of pins 19 and a cam lever 20 rising

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from the latter and engaging companion openings in the plate.

The means for effecting the universal adjustment of the tiltable table 15 for surveying purposes is preferably constructed as follows:

The numeral 21 indicates a shiftable yoke which is fastened at its lower end on a horizontal pivot shaft 22 extending diametrically across and journaled in the lower portion of the casing 14, while its upper end terminates in bifurcated arms 23 in which is journaled a horizontal shaft 24 disposed at right angles to the pivot-shaft 22. Depending from the working table are spaced arms 25 which are connected to the opposite ends of the shaft 24, so that when the latter is turned in one direction or the other, the working table is correspondingly tilted in anterior and posterior directions. This yoke is provided between its pivoted lower end and its bifurcated upper portion with a bearing or bracket portion 26 disposed parallel to the pivot-shaft 22 and in which is journaled an actuating shaft having a worm 28 thereon meshing with a worm wheel sector 29 pinned on the shaft 24. At its outer end the shaft 27 is provided with an actuating knob 30 for turning it and the worm gears to tilt the working table in anterior and posterior directions. The tilting movement of the working table in the opposite direction, that is its so-called minus and plus movement, is controlled by an actuating shaft 31 disposed at right angles to the companion actuating shaft 27 and extending through a bearing bracket 32 in the casing and having a worm 33 mounted thereon engaging a worm wheel sector 34 fixed on the yoke-pivoting shaft 22. At its outer end the shaft 31 is provided with an actuating knob 35 for turning it and the corresponding worm gears to tilt the working table in a lateral or minus-plus direction. Suitable indicators are provided for registering the degree of anterior and posterior tilt as well as the minus-plus tilt of the working table. For registering the anterior and posterior tilt a graduated scale 36 is applied to one side of the working table and cooperating therewith is a stationary pointer 37 fixed to the side of the adjoining yoke-arm 23, so that as the table is manipulated in its anterior and posterior movements by the actuating knob 30, the scale 36 is tilted with it relative to the pointer. For registering the minus-plus tilt the casing 14 is provided with a graduated scale 38 disposed above the axis of the actuating shaft 27 and cooperating therewith is a stationary pointer 39 applied to the adjoining end of the bearing portion 26

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of the yoke 21. These indicator scales are graduated in degrees with the zero reading disposed centrally of each scale.

For the purpose of maintaining the meshing gears 28, 29 and 33, 34 in proper engagement at all times to assure immediate response to the actuating knobs 30 and 35, respectively, in effecting the tilting of the table 15 fore and aft as well as sidewise, and to compensate for the wear of the rotating parts, the knob-actuated shafts 27 and 31 are preferably mounted as follows, and in this connection each mounting is the same and a description of one will suffice for both:

Each of the actuated shafts 27, 31 extends freely or in spaced relation through its companion bearing bracket 26, 32 and applied to the front end of each shaft between the actuating knob thereof and the opposing end of the bracket is a bearing collar 40 having an inwardly-extending sleeve 41 which fits freely within the bore 42 of such bracket. This collar is free to permit a limited angular displacement of the shaft in the bracket bearing, and a radially-disposed spring 43 housed in a hollow fitting 44 mounted on the bearing bracket and bearing at its inner end against the collar-sleeve 41, serves to normally urge the worm 28 or 33 into proper mesh with the companion worm wheel sector 29 or 34. Applied to each of the shafts 27, 31 between said collar and the worm gear 28 or 33 is a swivel bearing 45 which constitutes a fulcrum for the angular displacement of each shaft and bears on the inner end of the bracket-bore 42, the latter converging at such inner end to form a stop 46 against which the swivel bearing is adapted to abut. A coil spring 47 is applied to each shaft and bears at one end against the collar-sleeve 41 and at its other end against the swivel bearing 45 thereby stabilizing the position of these parts by constantly urging the swivel bearing inwardly against the stop 46 and each shaft together with its worm in the opposite direction or outwardly to bring such worm into proper and positive mesh with the companion worm wheel 29 or 34.

By mounting the knob-actuated shafts in this manner, they are permitted a yieldingly restrained angular displacement and a relative axial displacement so as to at all times assure proper meshing of the gears and accurate adjustment of the table to the tilted positions desired without objectionable lost motion. Furthermore, as the parts wear from continued use, they are automatically adjustable, through the medium of the springs 43 and 47 and the swivel bearings 45, to compensate for such wear.

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We claim as our invention:

1. A dental instrument of the character described, comprising a supporting member, a table surmounting the same for tilting movement, a bearing bracket having a longitudinal bore therein converging inwardly at one end thereof, a bearing sleeve extending loosely into one end of said bore, an axially-displaceable swivel bearing in the opposite converging end thereof, a shaft extending through and journaled in said bearing sleeve and said swivel bearing, gearing between the shaft and the table for tilting the latter in response to the actuation of said shaft, the shaft-gear being mounted on the extended end of the shaft beyond the swivel bearing and abutting at its other end against the opposing end of the bearing bracket, and a spring applied to said shaft and interposed between said sleeve and said swivel bearing.

2. A dental instrument of the character described, comprising a supporting member, a table surmounting the same for tilting movement, a bearing bracket having a longitudinal bore therein converging inwardly at one end thereof, a bearing sleeve extending loosely into one end of said bore, an axially-displaceable swivel bearing in the opposite converging end thereof, a shaft extending through and journaled in said bearing sleeve and said swivel bearing, said shaft having an actuating knob at its outer end and said sleeve having a collar at its outer end interposed between said shaft-knob and the opposing end of said bracket, gearing between the shaft and the table for tilting the latter in response to the actuation of said shaft, the shaft-gear being mounted on the extended end of the shaft beyond the swivel bearing and abutting at its other end against the opposing end of the bearing bracket, a spring applied to said shaft and interposed between said sleeve and said swivel bearing, and yieldable means acting at right angles to said shaft for constantly urging it in one direction about the swivel bearing.

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The following references are of record in the file of this patent:

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Number	Name	Date
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