

April 16, 1963

J. PÄTZOLD ETAL
DENTAL UNIT

3,085,338

Filed Oct. 24, 1960

6 Sheets-Sheet 1

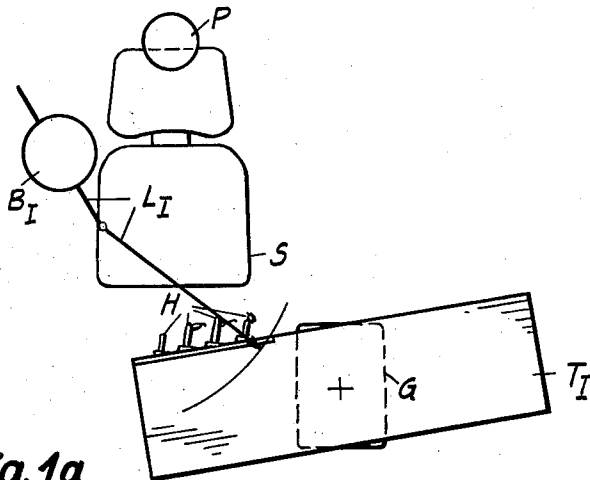


Fig. 1a

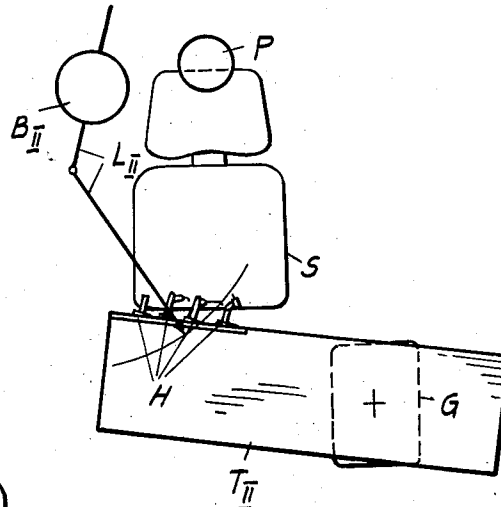


Fig. 1b

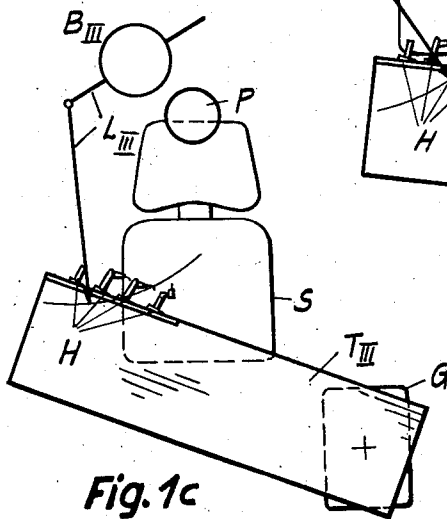


Fig. 1c

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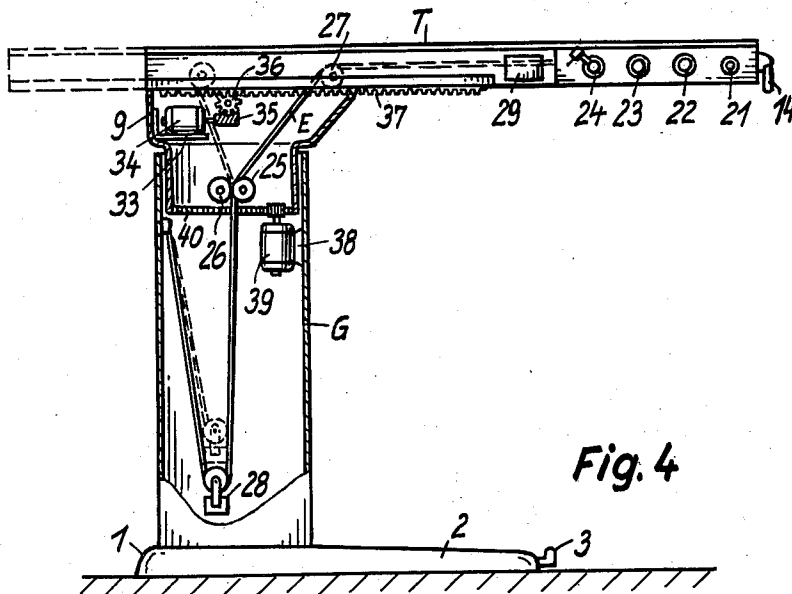


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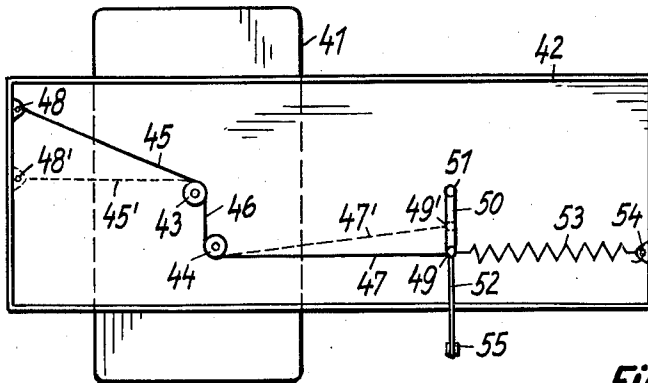


Fig. 5

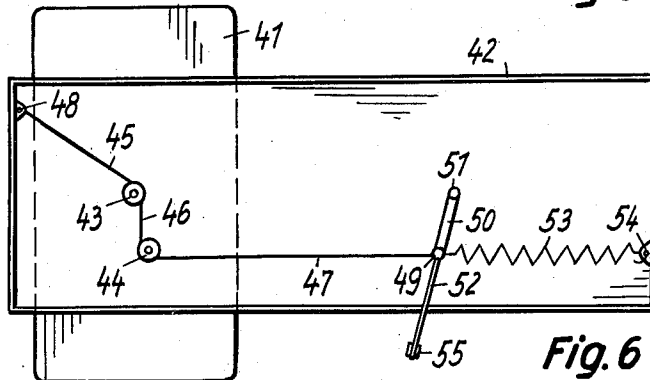


Fig. 6

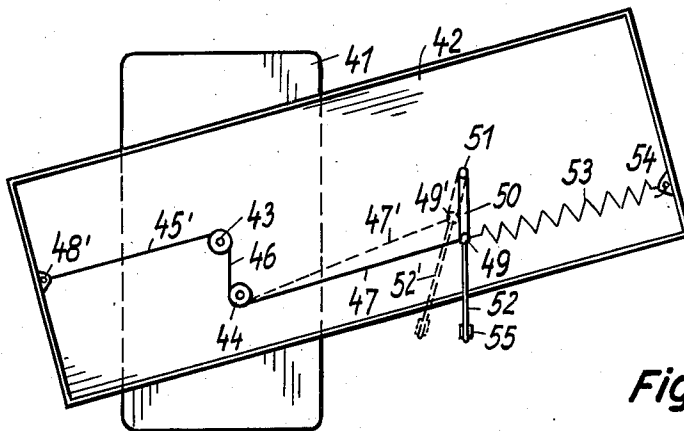


Fig. 7

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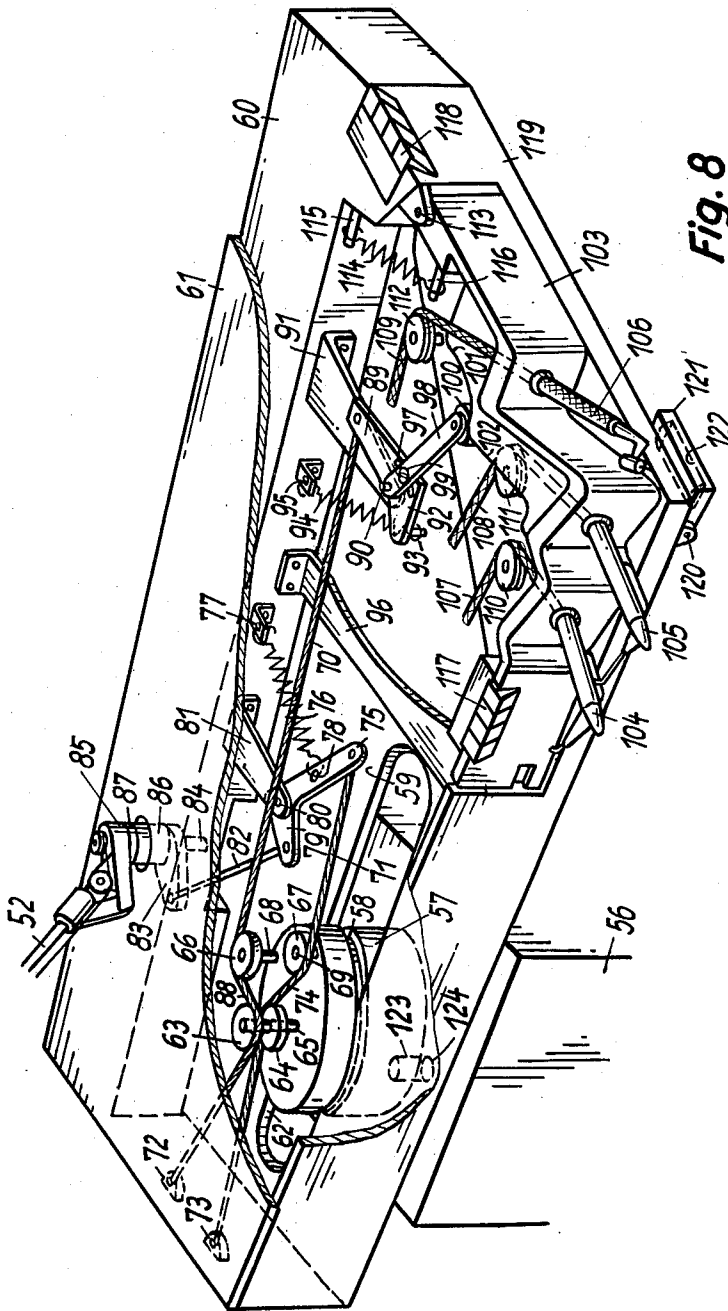


Fig. 8

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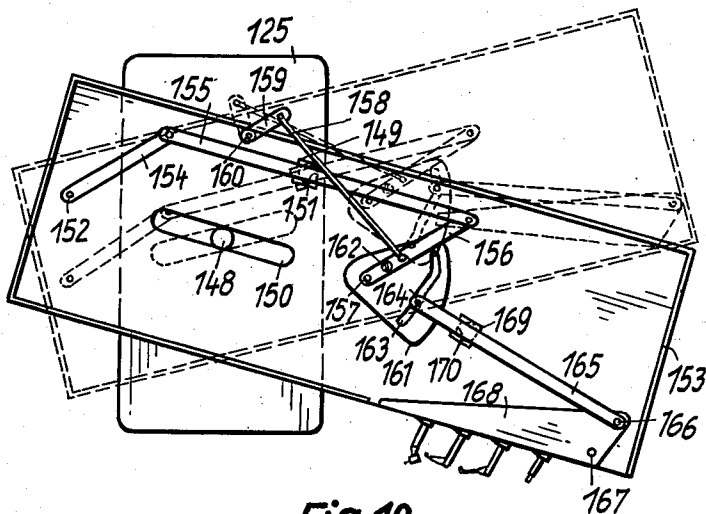
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DENTAL UNIT

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Filed Oct. 24, 1960, Ser. No. 64,475

Claims priority, application Germany Oct. 29, 1959

6 Claims. (Cl. 32-22)

This invention relates to a dental unit with a carrier stand extending substantially in vertical direction and an instrument table of substantially rectangular shape, in which in one half of its length dental handpieces are detachably mounted and which is supported by the stand.

In the dental practice it is necessary for the dentist to change his working position in relation to the patient according to the position of the tooth to be treated. In one case it would be convenient for the dentist to stand laterally in front of his patient, whereas in another case it would be necessary for him to assume a working position laterally or laterally behind his patient. These different working positions of the dentist in relation to his patient require that the dental handpieces detachably mounted in the instrument table and frequently used during the treatment and any instruments placed on the table must be always easily available to the dentist, that is to say that the instrument table must be capable of being always moved close enough to the dentist. The dentist must thus not be compelled to change a working position favorable for the treatment to one which is not so convenient for carrying out the work, in order to be able to reach the necessary handpieces and the instruments deposited on the table. Dental units are known which have dental handpieces detachably mounted in an instrument table which is mounted for a mere swinging movement about a vertical axis of a stand of the unit. These arrangements, however, do not yet meet the above-mentioned requirement.

It is an object of the present invention to provide a satisfactory solution to the problem of supporting the instrument table of the dental unit of the above-described kind on the stand, which overcomes the said disadvantage and establishes favorable conditions for rendering the handpieces and the instruments placed on the instrument table readily available to the dentist when he is in any of the working positions coming into question.

To achieve this object, the dental unit according to the invention comprises a carrier stand extending substantially in vertical direction, an instrument table of substantially rectangular shape, dental handpieces detachably mounted in one half of the length of said instrument table, said instrument table being supported on said carrier stand by means of guide members arranged on said instrument table and cooperating with counter-guide members arranged on said carrier stand, said guide members and said counter-guide members being so shaped and arranged that the center of gravity of said instrument table is horizontally shiftable in relation to the support thereof on said carrier stand at least over a portion of the length of said instrument table which is free from the handpiece mountings, said counter-guide members forming parts of a headpiece of said carrier stand which is rotatable on bearing members like a turntable about a vertical axis of the stand on which it rests, so that when the stand is set up at one side of a patient, the longitudinal half of the instrument table carrying the handpieces is within easy reach of a dentist in all three operating positions on the other side of the patient, namely laterally in front of, beside and laterally behind the patient.

An important feature of the invention resides in that,

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in the case of fitting the instrument table with a carrier arm for a dental drill handpiece, which is shiftable about a vertical axis on the top of the instrument table, and grouping the mountings of the handpieces to form a unit which is shiftable about a vertical axis in the table, like a shelf which can be introduced into the inner space of the table between the top and bottom thereof, driving means are provided for turning the carrier arm of the drill handpiece and for swinging the handpiece shelf, respectively, and that control means are coordinated to the driving means and become effective depending upon a displacement of the instrument table and upon the turning of the headpiece of the stand, respectively.

This renders it possible to attain that, when adjusting the instrument table when the dentist moves from one place to another, the carrier arm automatically moves into a position which is favorable for the working position the dentist has assumed and that the drill handpiece is just as handy for the dentist to reach and the handpiece shelf, on the instrument table being swung backwards, swings into the inner space of the table and, on the table being swung forwards, swings again out of the table.

Several preferred embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

FIGS. 1a-1c are diagrammatic views showing three different characteristic working positions of a dentist with respect to his patient;

FIG. 2 is a diagrammatic perspective view of a dental unit according to the invention;

FIG. 3 is a fragmentary diagrammatic cross-sectional view of the dental unit shown in FIG. 2;

FIG. 4 is a side elevational view, parts broken away, of the dental unit shown in FIG. 2;

FIG. 5 is a top plan view of essential controlling and driving parts in the instrument table, indicating also modified forms of construction thereof;

FIG. 6 is a view similar to FIG. 5, but showing the instrument table in a position in which it is shifted horizontally in relation to its carrier post;

FIG. 7 is a view similar to FIG. 5, but showing the instrument table in a shifted position;

FIG. 8 is a more detailed fragmentary perspective view of another form of construction of the dental unit, with parts broken away;

FIG. 9 is a top plan view of another form of construction of the controlling means of the instrument table shown in FIG. 8; and

FIG. 10 is a view similar to FIG. 9, but showing still another form of construction of the controlling means of the instrument table shown in FIG. 8.

FIGS. 1a to 1c show a dentist standing in the three most usual working positions. B_I is the working position of the dentist laterally in front of a patient P, B_{II} the working position of the dentist at the side of and B_{III} the working position of the dentist laterally behind the patient P and a dental chair S. A rectangular instrument table is provided for the dentist, which table is shiftable in the direction of its longitudinal axis on a carrier stand G and arranged to turn or swing about a vertical pivot pin of the carrier stand G, preferably about the central vertical axis of the carrier stand. Dental handpieces H, for example spraying and blowing handpieces, turbine burs and the like, are arranged in the end portion of the instrument table adjacent the dentist and can be pulled out in a known manner towards the patient P.

The possibility of shifting the instrument table horizontally and turning or swinging it about a vertical axis enables the instrument table to be brought into such positions in relation to the dentist that the handpieces H

and any instruments lying on top of the instrument table are always readily available to the dentist, irrespective of the position in which he is operating. Thus, for example, as shown in FIG. 1a, when the dentist is in the working position B_I , the instrument table will be brought into the position T_I . In this position of the instrument table, the handpieces H can be gripped without difficulty in a most convenient manner by the dentist whose operating arm is in a position designated by the reference character L_I . These favorable conditions are maintained as shown by the positions L_{II} and L_{III} of the operating arm of the dentist in FIGS. 1b and 1c when the dentist is in the working positions B_{II} and B_{III} and the instrument table has been brought into corresponding relative positions. Between his two extreme working positions B_I and B_{III} the dentist can assume any intermediate working positions, since the instrument table can be brought into corresponding intermediate positions between its positions T_I and T_{III} as for example that indicated with the dentist in the working position B_{II} and the relative positions T_{II} of the instrument table.

As can also be seen from FIGS. 1a to 1c, a particular advantage resides in that in all relative positions of the instrument table, not only a favorable distance is given for gripping the handpieces and any instruments lying on the table, but also the direction of the handpieces towards the patient remains practically unchanged.

Referring to FIG. 2, the post-like carrier stand G of a dental unit according to the invention is mounted on a base 1 of box-like construction and having a generally rectangular extension 2. The extension 2 increases, on the one hand, the stability of the dental unit so that means for fixing the unit to the floor can be dispensed with and, on the other hand, extends preferably to a point under the footrest of the dental chair and serves for accommodating shutoff devices for pressure medium conduits and electric current, which shutoff devices can be controlled by means of a pivot lever 3 projecting from the extension 2. The pivot lever 3 is so mounted in the free end face of the extension 2 that it can easily be operated by the dentist standing on the right side of the dental chair. Attachments 4 and 5 (FIG. 3) can be fastened to side walls of the carrier stand G and if desired, may be exchangeable. Thus, for example, the attachment 4 can support articles to be supplied with water, such as a spittoon 6, a mouth rinsing glass 7 and so forth, whereas the attachment 5 has a connection 8 (FIG. 3) for the carrier arm of an operating lamp.

Mounted on the upper end of the carrier stand G is a headpiece 9 which serves for holding an instrument table T. The headpiece 9 has guides 10 in which the substantially rectangular instrument table T is horizontally shiftable in the direction of its longitudinal axis by means of counter-guides 11. As shown in FIG. 3, the headpiece 9 has a projection 12 extending into the interior of the carrier stand G and is rotatable about the central vertical axis of the carrier stand G by means of a collar bearing 13 provided in the upper end of the carrier stand. On the end face of the instrument table T adjacent the dentist a handle 14 is provided which he can easily reach. With the aid of this handle the instrument table can be shifted in horizontal direction without difficulty and at the same time swung about the said vertical axis and in this manner brought into a relative position corresponding to the actual working position of the dentist.

For fixing the instrument table T in its adjusted relative position, locking devices are provided which can be actuated by means of the handle 14. For fixing the instrument table when shifted in the longitudinal direction, a locking device 15, 16 is provided, whereas for securing the instrument table in its turned or shifted position, a locking device 17, 18 is provided. The parts 15 and 17 of these two locking devices can be operated by means of the handle 14 against the force of springs 19 and 20, so that under the action of these springs they can auto-

matically engage with the parts 16 and 18, respectively.

Mounted in the end portion of the instrument table T adjacent the dentist are handpieces 21, 22 and 23, for example for spraying and blowing, endoscopic and caustic treatment, pulp testing and the like, as well as a handpiece 24 for an air turbine drilling machine, which handpieces are arranged to be pulled out in a direction towards the patient. As can be seen from FIG. 4, power supply means E, for example, pressure medium feed conduits and electric leads, are guided to the handpieces over rollers or pulleys 25, 26 and 27 mounted in the headpiece 9, these pulleys being so arranged that, on the instrument table T being shifted longitudinally, a smooth movement of the means E is ensured. These means are preferably arranged side by side in parallel vertical planes and loaded in a known manner by weights 28.

In the instrument table, so far as it is not covered by the headpiece 9, receptacles for dental accessories can be arranged. Thus, for example, as shown in FIG. 2, a receptacle 29 is provided at the front side of the instrument table, whereas at the end of the instrument table in proximity to the dentist a pivoted shelf 30 can be arranged to serve as a support for an electric heater 31 or the like. Similarly, swivel shelves or drawers (not shown) can be accommodated at the end of the instrument table remote from the dentist, and served by the dentist's assistant.

Mounted on the table top is an electric drilling machine 32 (FIG. 2) which is also fitted within easy reach of the dentist so that it is readily available to him in any of his working positions when the instrument table has been adjusted to its appropriate relative position. Furthermore, a film viewer F (FIG. 2) which can be seen by the dentist and the patient when the instrument table is in any working position, is provided on the instrument table and may be introduced in the receptacle 29.

Whereas the extension 2 of the base 1 projects under the footrest of the dental chair, the instrument table T extends like a jib over the lap of the patient. In order to avoid any inconvenience when adjusting the height of the dental chair, an operating bar or the like (not shown) can be arranged on the underside of the instrument table, by means of which bar the feed conduits for a height adjusting device of the dental chair can be interrupted when upward pressure is exerted, for example by the armrests of the dental chair or the arms of the patient upon this bar.

The instrument table T can be adjusted by motor power if desired, an adjusting motor being preferably provided for the longitudinal displacement of the table T and another adjusting motor for the turning or swinging movement thereof. For example, as shown in FIG. 4, an electric motor 34 for effecting the longitudinal displacement is fixed on a bracket 33 mounted in the headpiece 9 of the carrier stand G and has a driving worm 35. This worm meshes with a pinion 36 which in turn meshes with a toothed rack 37 mounted on the underside of the instrument table, for moving the instrument table in longitudinal direction. Similarly, another electric motor 39 is mounted on the inner side wall of the carrier stand G by means of a bracket 38 and serves for rotating the headpiece 9. This motor has a reduction gear (not shown) built in its housing and is provided with a driving pinion which engages in an annular internal toothing 40 in the headpiece 9 of the carrier stand. For controlling the two preferably electric adjusting motors, a common switching mechanism can be provided which is so constructed in a known manner that either each motor can be separately controlled or both motors simultaneously controlled and regulated to the desired adjustment speeds.

Referring to FIG. 5, which shows an instrument table of a dental unit in a mean position in relation to a rectangular carrier stand 41, the instrument table, bordered by a frame 42, is rotatable on the rectangular carrier stand 41 and slidable thereon in its longitudinal direction

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in a manner which is known and therefore not illustrated in detail. Two guide pulleys 43 and 44 are mounted stationary in the carrier stand 41. A cord or cable composed of lengths 45, 46 and 47 is guided over these pulleys. This cord or cable is anchored at one end at 48 to one of the end walls of the instrument table while its other end is attached at 49 to one end of a lever arm 50 which is pivotally mounted at its other end at 51 in the instrument table and serves as a driving means for a carrier arm 52 also pivoted at 51. This carrier arm 52, in order to give a better idea of the manner in which it functions, is here shown as being directly affixed to the lever arm 50. Between the fastening point 49 of the cord length 47 on the lever arm 50 and the other end wall of the instrument table there is arranged a tension spring 53 which is anchored at 54. The modifications indicated in dash lines will be described later.

The cord length 46 and the lever arm 50 together form two sides of a control parallelogram. The other sides thereof are formed by the cord length 47 and the portion of the instrument table which extends in an imaginary line between the guide pulley 43 and the pivot 51. The patient, who is not shown for the sake of clarity, is situated approximately in the extension of the carrier arm 52.

If, as shown in FIG. 6, the instrument table is shifted towards the right, a turning movement in clockwise direction will be imparted to the carrier arm 52. This turning movement is due to the fact that the length of the cord length 45 does not change proportionately to the displacement path of the table. This can easily be seen from a simple rough calculation in which the cord length 45 is the hypotenuse of a right-angled triangle, the base of which is formed by a perpendicular line on the end wall carrying the fastening point 48. With the change in length of the cord length 45, the length of the cord length 47 also changes, thereby resulting in the above-mentioned turning movement of the carrier arm 52. Consequently the end of the carrier arm 52 carrying a cord pulley 55 and usually also a drill handpiece, retains its position in space and in relation to the patient when the instrument table is shifted, and the drill handpiece is always within the same easy reach of the dentist. Analogously, a turning movement of the carrier arm 52 in anti-clockwise direction is effected if the instrument table is shifted towards the left out of the position shown in FIG. 5.

If the cord length 45 is replaced by a cord length 45¹, as indicated in a dash line in FIG. 5, which extends perpendicularly to the left end wall of the instrument table and is anchored at 48¹, the carrier arm 52 will not be turned when the table is shifted in longitudinal direction, because in this case, as can easily be seen, the length of the cord length 45¹ changes strictly proportionately to the path of displacement of the table.

In both ways of disposing the cord length 45, a turning movement of the carrier arm 52 about the pivot 51 will also be caused when the instrument table is swung about a vertical axis of the carrier stand 41. It is assumed, for the sake of simplicity, that this vertical axis corresponds to the axis of rotation of the guide pulley 43. If, as can be seen from FIG. 7, the instrument table is swung for example towards the rear, the guide pulleys 43 and 44, being arranged stationary, will retain their positions in relation to the instrument table. Thus, as can be seen from FIG. 7, the cord length 46 maintains its direction in relation to the carrier stand 41. As a result, owing to the mode of action of the parallelogram, the lever arm 50 also retains its direction in relation to the front wall of the carrier stand 41 and consequently turns on the pivot 51 in relation to the instrument table. Analogously to FIG. 5, the final effect will be that the cord pulley 55 and the carrier arm of the drill handpiece retain their positions in space and consequently in relation to the patient when the instrument table is swung.

If the cord length 47 is replaced by a cord length 47¹ fixed to the lever arm 50 at 49¹, an increase in the length

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of path of the cord length 47 will occur due to this modification of the parallelogram when the instrument table is swung, because the side of the parallelogram between the fastening point 49¹ and the pivot 51 is shorter than its corresponding side 46 of the parallelogram. This increase of the length of path imparts to the lever arm 50 an additional turning movement, so that the carrier arm 52 assumes a position 52¹ shown in dash lines in FIG. 7, which is particularly advantageous to enable the patient to leave the dental chair.

The transmission ratios illustrated in FIGS. 5 to 7 will not be changed if, in a modification, instead of the lever arm 50 a cord pulley is mounted in the pivot 51, which pulley has a radius equal to the length of the lever arm 50 and positively guides the cord length 47. As this can easily be understood, an illustration of the modified construction is not included in the drawings.

FIG. 8 shows a more detailed construction of another embodiment of the dental unit according to the invention. As shown in this figure, a rectangular carrier stand 56 carries on its upper side a cylindrical extension 57 which is provided with a peripheral groove 58. The bottom 59 of an instrument table 60 bearing a table top 61 is provided with an elongated slot 62 which is slidable in the groove 58. The instrument table 60 can therefore be shifted in a simple manner in longitudinal direction and also be shifted along a circular path about the stationary extension 57 of the carrier stand 56.

The flat top of the cylindrical extension 57 carries a number of cord pulleys. Pulleys 63 and 64 are freely rotatable on a common shaft 65 whereas pulleys 66 and 67 are rotatably mounted on separate stub shafts 68 and 69. The shaft 65 is arranged substantially centrally of the circular top of the cylindrical extension 57.

Two cord lines 70 and 71 are guided over the above-mentioned pulleys in the manner indicated in FIG. 8, and anchored at one of their ends in eyes 72 and 73, respectively, affixed to the rear end wall of the instrument table 60. The cord line 71 has a cord length 74 which forms, in an analogous manner to the arrangement shown in FIG. 5, one side of a parallelogram, the other side of which is formed by a lever arm 75. The cord line 27 is held under pre-tension by means of a spring 76 which is at one end anchored at 77 on the rear longitudinal side wall of the instrument table 60 and engages at its other end the lever arm 75 at 78. The lever arm 75 is part of an angle lever comprising the lever arm 75 and a lever arm 79 and pivotally mounted at 80 on a bracket 81 fixed to the rear longitudinal side wall of the instrument table.

The lever arm 79 is part of another parallelogram which includes this arm, a connecting rod 82, a lever arm 83 and an imaginary line between a rotation axis 84 of the carrier arm 52 for a drill handpiece and the pivot 80 in the bracket 81. The carrier arm 52 is not rigidly connected with the lever arm 83, but by means of a slip clutch 87 introduced between the base 85 of the carrier arm and a part 86 of the lever arm 83. This slip clutch 87 can, for example, be formed by suitably constructing the adjacent end faces of the base 85 and the part 86.

If the instrument table 60 is shifted longitudinally or swung about the cylindrical extension 57, a rotary movement will be imparted to the lever arm 75, as in the case of FIGS. 5 and 7, which movement is transmitted to the carrier arm 52 for the drill handpiece through the intermediary of the lever arm 79, the connecting rod 82 of the auxiliary parallelogram, the lever arm 83, the part 86, the slip clutch 87 and the base 85. The auxiliary parallelogram comprising the parts 79, 82, and 83 is necessary in this case because, contrary to the arrangement shown in FIGS. 5 to 7, the carrier arm 52 is arranged above the carrier stand 56, and not in the shifting direction of the instrument table. This makes the use of a single control parallelogram as in FIGS. 5 to 7 not quite possible. However, from the construction of the mechanical transmitting means disposed between the

pulley 64 and the carrier arm 52 it can be seen that the carrier arm 52 can be arranged at any desired place of the instrument table 60 by introducing an auxiliary parallelogram, and, consequently, there are no restricting conditions for the choice of where the carrier arm is to be located. By introducing the slip clutch 87 it is possible for the dentist to bring the carrier arm 52 in a very simple manner into a predetermined adjusted position by hand.

The cord line 70 has a cord length 88 which represents one side of another parallelogram disposition. This parallelogram disposition is formed by a cord length designated by the reference numeral 70, the cord length 88, a lever arm 89 and the connecting line from the shaft 65 of the pulley 63 to a pivot 90 of the lever arm 89. The pivot 90 is located in a bracket 91 which is mounted on the rear longitudinal side wall of the instrument table 60. The lever arm 89 forms with a lever arm 92 an angle lever, the free end of the lever arm 92 having a pin 93 depending therefrom which is engaged by a tension spring 94 keeping the cord line 70 under tension, and for this purpose being anchored at its other end to the rear longitudinal side wall of the instrument table by means of an angle eye 95. A reinforcing crossbar 96 is fixedly mounted between the longitudinal front and rear walls of the table 60.

The angle lever comprising the lever arms 89 and 92 has an arcuate slot 97 formed therein. A lever 98 is mounted at one end on the pivot 90. Fitted in this lever 98 is a screw 99 which extends through the slot 97 and can be positively connected with the angle levers 89 and 92 by means of a nut (not shown) situated underneath the slot.

A roller 100 is rotatably mounted at the opposite end of the lever 98. This roller is arranged to travel along a cam which is composed of cam paths 101 and 102 and arranged on the inner side of a swing shelf 103 which is stepped on its front side facing the viewer. The shelf 103 forms a drawer-like receptacle for dental handpieces 104, 105, and 106 having supply or power lines 107, 108, and 109, respectively, which handpieces are mounted in these steps, the supply or power lines being guided over pulleys 110, 111, and 112, respectively. The swing shelf 103 is pivoted at 113 is acted upon by a tension spring 114 which engages at one end a stationary pin 115 fixed on the inner side of the table, and at the other end a pin 116 fixed on the swing shelf 103. The effect of the tension spring 114 is that the cam path 101 always bears against the roller 100. The swing shelf 103 has a set of keys 117 which may be provided for various functions, such as for switching in resistors for adjusting the number of revolutions of the motor for the drilling machine. Another set of keys 118 is fitted on the end face 119 of the instrument table 60.

The shape of the cam path 101 is so chosen that it corresponds to the swing radius of the roller 100. When pressure is exerted upon the swing shelf 103, for example when pushing a handpiece back into its holder, this will have an effect on the lever 98 only in the longitudinal direction thereof and thus leave the position of the parallelogram connected with this lever unaffected. When the instrument table 60 is swung from the position shown in FIG. 8 towards the viewer, the roller 100 moves along the cam path 101, that is, in counter-clockwise direction, as can easily be seen by observing the behaviour of the two parallelogram sides 88 and 89. As a result, there is no change in the swung out position of the swing shelf 103 shown in FIG. 8, because, as stated above, the shape of the cam path 101 corresponds to the swing radius of the lever 98 with the roller 100. If, on the other hand, the instrument table is swung out of the position shown in FIG. 8 towards the rear away from the viewer, the roller 100 runs along the control cam 101 to the control cam 102, the lever 98 thereby moving in clockwise direction. On reaching a given angular position, the roller

100 leaves the cam path 101 and then travels along the cam path 102 which is so shaped that the swing shelf 103 moves, under the action of the tension spring 114, into the interior of the instrument table. As a result, the handpieces 104, 105, and 106 disappear behind the front wall of the instrument table and therefore, do not hinder the patient when he is leaving the dental chair. With the aid of the screw 99 in conjunction with the slot 97 it is possible to adjust the point from which the swing shelf 103 disappears into the table 90 when it is being swung back.

A flat handle 121 adapted to turn about a pivot 120 and provided with a gripping recess 122 serves for swinging the table 90. A pot-shaped electromagnet 123 is secured to the underside 59 of the instrument table above the carrier stand 56 in such a manner that its underside 124 is directly opposite the surface of the carrier stand. This electromagnet, which is of known construction and therefore, not shown in detail, is continuously energized over a normal or break contact (not shown) carried by the handle 121. Therefore, in the event of the table 60 being unintentionally moved in any direction, eddy currents will occur in the metallic surface of the carrier stand 56 and prevent further movement of the table. If, on the other hand, the table is moved by means of the handle 121, the electromagnet 123 becomes deenergized because the break contact connected with the handle opens. Thus, on the one hand, the instrument table can easily be moved into any desired position by hand and, on the other hand, any unintentional movement of the instrument table is effectively prevented.

In FIG. 8, two separate parallelograms are employed for turning the carrier arm for the drill handpiece and for moving the swing shelf. This involves the advantage that the dimensions of each of these parallelogram dispositions can be determined as desired. As shown in the form of construction of FIG. 9, the movement of the swing shelf and the turning of the carrier arm can also be effected by a common parallelogram. A stand 125 carries, as in FIG. 5, two stationary pulleys 126 and 127 over which extends a cord line composed of cord lengths 128, 129, and 130. As in FIG. 5, this cord line is anchored at one end to an eye 131 fixed on a left narrow side wall 132 of an instrument table, and at the other end at 133 to a lever arm 134 pivoted at 135. A carrier arm 136 is affixed to the lever arm 134 and carries cord pulleys 137. A spring 138 corresponding to the spring 59 of FIG. 5 is fixed at one end at 139 to the opposite narrow side wall of the instrument table. A swing shelf 141 pivoted at 140 is under the action of a tension spring 142 which engages the swing shelf at 143 and is anchored in an eye 144 fixed on the rear side wall of the instrument table. This spring 142 causes the swing shelf 141 to be normally held in swung out position. A pull rod 146 consisting for example of spring wire engages the swing shelf at a point 145 opposite the fastening point 143 and is provided at its opposite end with an elongated eye 147 which surrounds in the manner shown in FIG. 9 the fastening point 133, constructed for example as a pin, at which the cord length 130 and the spring 138 are attached to the lever arm 134 of the carrier arm 136.

When the instrument table is swung in clockwise direction, the fastening point 133 slides in the eye 147 towards the right, so that no mechanical action is exerted upon the eye 147. If, however, the table is swung back in counterclockwise direction, the pin 133 slides towards the left without influencing the eye 147. However, in the event of further backward swinging movement of the table, this eye will be carried along by the pin 133 and swings, through the intermediary of the pull rod 146, the shelf 141 into the interior of the table.

It is not absolutely necessary that, as shown in FIGS. 5 to 9, two corner points, that is, a side of the control parallelogram, always be fixedly mounted in the carrier stand and two sides of the control parallelogram be con-

structed as cord lengths. In FIG. 5, the parallelogram is controlled by the parallelogram side represented by the stationary pulleys 43 and 44. Similarly, the control of the parallelogram shown in FIG. 10 is effected by stationary points 148 and 149. The point 148 is arranged to slide, like the extension 57 of FIG. 8, in an elongated slot 150. The point 149 is constructed as a sliding shoe and in fixed manner rotatably mounted in the carrier stand 85 by means of a pin 151. The control parallelogram in this case includes a parallelogram rod 154 pivoted at 152 on an instrument table 153, another parallelogram rod 155 which is guided in the sliding shoe 149, and still another parallelogram rod 156 which is fixedly and rotatably mounted on a pivot 157 mounted in the table 153. The fourth parallelogram side is represented by the connecting line between the pivots 152 and 157.

The parallelogram rod 156 is connected through the intermediary of a rod 158 to a driving arm 159 for a carrier arm (not shown) rotatably mounted at 160. The driving arm 159, the connecting rod 158, the portion of the parallelogram rod 156 adjacent the pivot 157 and the connecting line between the pivots 157 and 160 form, analogously to FIG. 8, an auxiliary parallelogram operated by the control parallelogram and serving for moving the carrier arm for a drill handpiece. On the pivot 157 for the parallelogram rod 156 there is mounted a sector-shaped disc 161 which is rigidly connected with the parallelogram rod 156 by a screw 162. The disc 161 is provided with a control slot 163 in which a pin 164 is slidable which is fitted in one end of a connecting rod 165 which engages at 166 a swing shelf 168 pivotally mounted at 167. The rod 165 is guided by a sliding shoe 169 which is mounted for rotation about a pin 170 fixed in the table 153.

This arrangement operates in the following manner:

To facilitate the understanding, let it be first assumed that the parallelogram rod 154 is fixedly mounted at the points 148 and 151, the parallelogram rod 155 being shortened correspondingly. When the instrument table 153 is swung towards the rear out of the position shown in FIG. 10, the parallelogram rod 156 parallel to the rod 154 retains its direction in relation to the carrier stand 125 on account of the action of the parallelogram. As, however, the instrument table has changed its position in relation to the carrier stand, the rod 156 changes its position in relation to the instrument table, so that, through the intermediary of the parallelogram rod 158 of the auxiliary parallelogram, the desired turning movement takes place about the pivot 160 of the carrier arm. As indicated in dash lines in FIG. 10, the parallelogram assumes an extended, flat shape. The same will also be effected by the stationary sliding points 148 and 149 arranged spaced apart by a distance corresponding to the length of the parallelogram rod 154, and consequently acting as an additional third parallelogram rod parallel to the parallelogram rods 154 and 156. The parallelogram 154, 155, and 156 therefore assumes the position shown in dash lines in relation to the instrument table when the instrument table is swung rearwardly.

When the instrument table 153 is swung towards the rear, the pin 164 slides in the sector-shaped disc 161 moving in clockwise direction. Owing to the shape of the control slot 163, a force is exerted upon the rod 165 in the direction towards the point 166, thereby bringing the swing shelf 168 into the swung-in position indicated in dash lines in FIG. 10.

Changes may be made within the scope and spirit of the appended claims which define what is believed to be new and desired to have protected by Letters Patent.

We claim:

1. A dental unit comprising a substantially vertically extending carrier stand in which are enclosed control components required for the operation of dental hand pieces, including electrical switching elements, an instrument table of elongated substantially rectilinear configuration, holding means for dental hand pieces disposed in one half of the length of said instrument table, securing means located within the other half of said instrument table, for disposing said instrument table so as to extend on top of said carrier stand in the manner of a horizontally directed beam, said securing means comprising, in combination, means forming at least one circular track for disposing said instrument table for rotation about the vertical axis thereof, and two mutually cooperating guide members extending longitudinally of said instrument table for disposing such instrument table for rectilinear motion in horizontal direction.

2. A dental unit according to claim 1, comprising a base member on which said carrier stand is mounted, said base member having an extension projecting therefrom, and foot operable switching means carried by said extension at the end thereof which faces away from said carrier stand, for governing the operation of predetermined control components.

3. A dental unit according to claim 1, comprising means in said instrument table forming a drawer-like receptacle for said dental hand pieces, means for disposing said receptacle for pivotal motion about a vertical axis, and drive means for moving said receptacle from one to the other end position thereof depending upon the horizontal rotation of said instrument table, said dental hand pieces being in one end position of said receptacle disposed substantially within said instrument table while projecting therefrom when said receptacle is in the other end position.

4. A dental unit according to claim 1, comprising a carrier arm for a dental instrument, means for mounting said carrier arm on said instrument table for motion about a vertical axis, and drive means for moving said carrier arm depending upon the horizontal motion of said instrument table.

5. A dental unit according to claim 1, comprising a carrier arm for a dental instrument, means for mounting said carrier arm on said instrument table for motion about a vertical axis, and drive means for moving said carrier arm depending upon the rotation of said instrument table about the vertical axis of said carrier stand.

6. A dental unit according to claim 5, wherein said drive means comprises a cable or the like, means for anchoring one end of said cable at said instrument table, roller-like members for guiding said cable, spring means for tensioning said cable, said cable forming two mutually adjacent sides of a parallelogram, a lever cooperatively related to said carrier arm, and means for transmitting to said lever the force exerted by said cable for effecting displacement of said carrier arm.

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