

Dec. 8, 1964

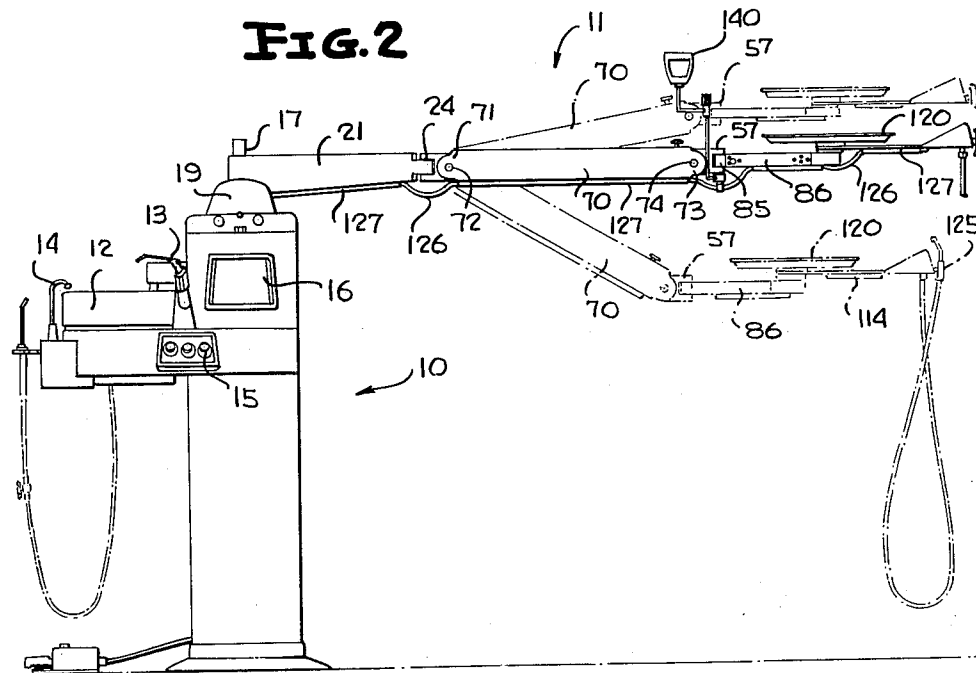
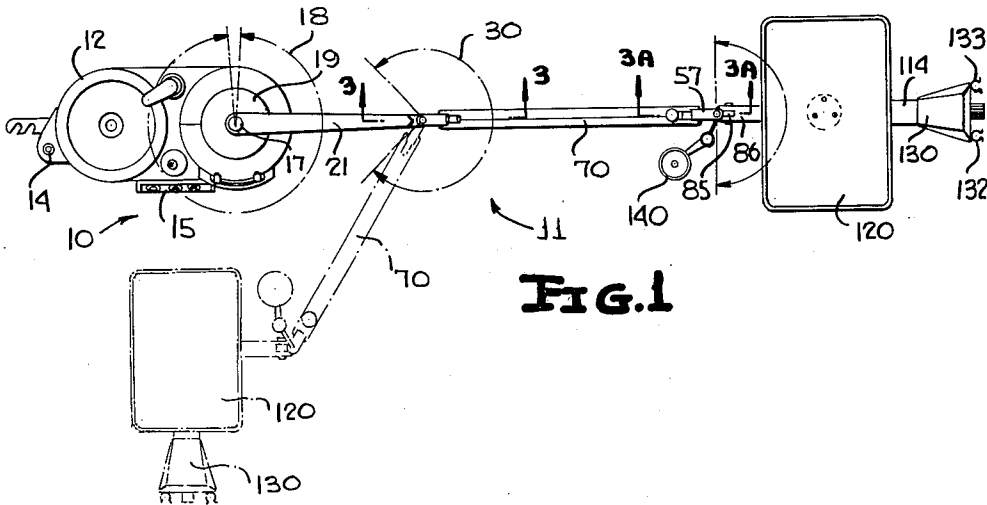
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TRAY SUPPORT FOR A DENTAL UNIT

Filed Oct. 29, 1963

5 Sheets-Sheet 1



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FIG. 4

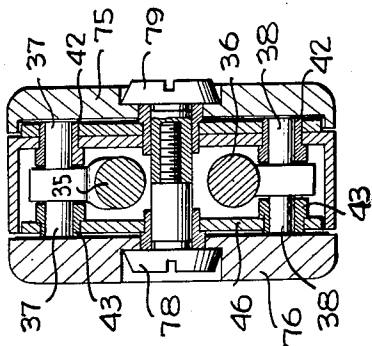


FIG. 3

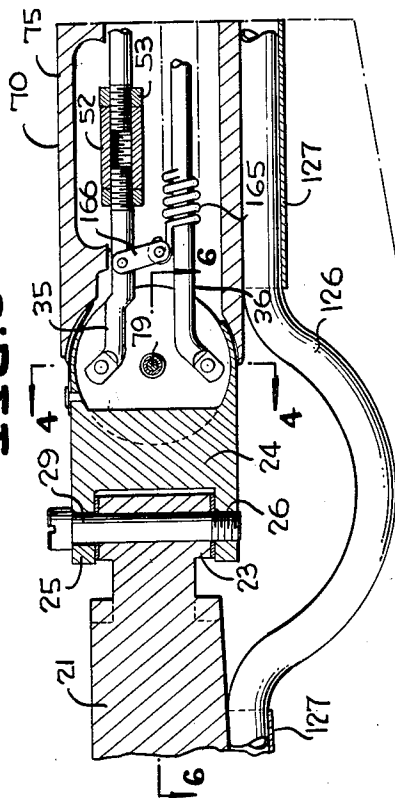
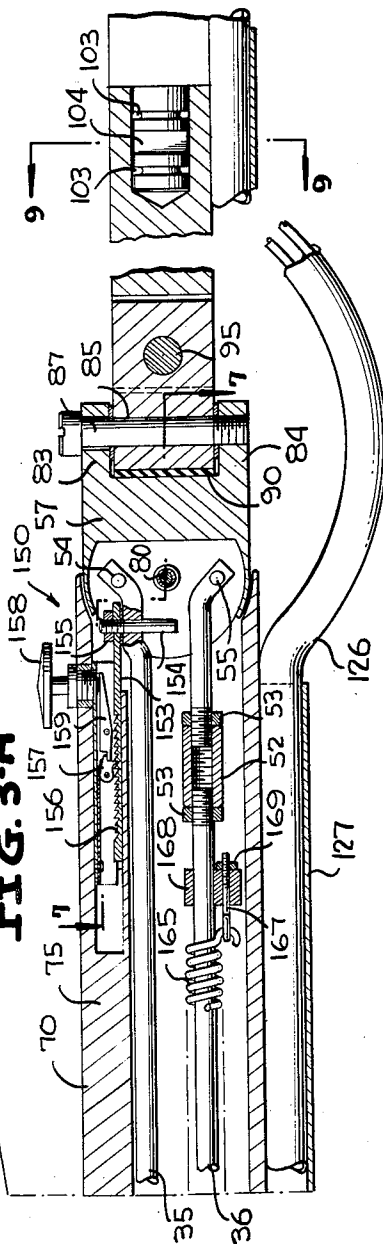


FIG. 3-A



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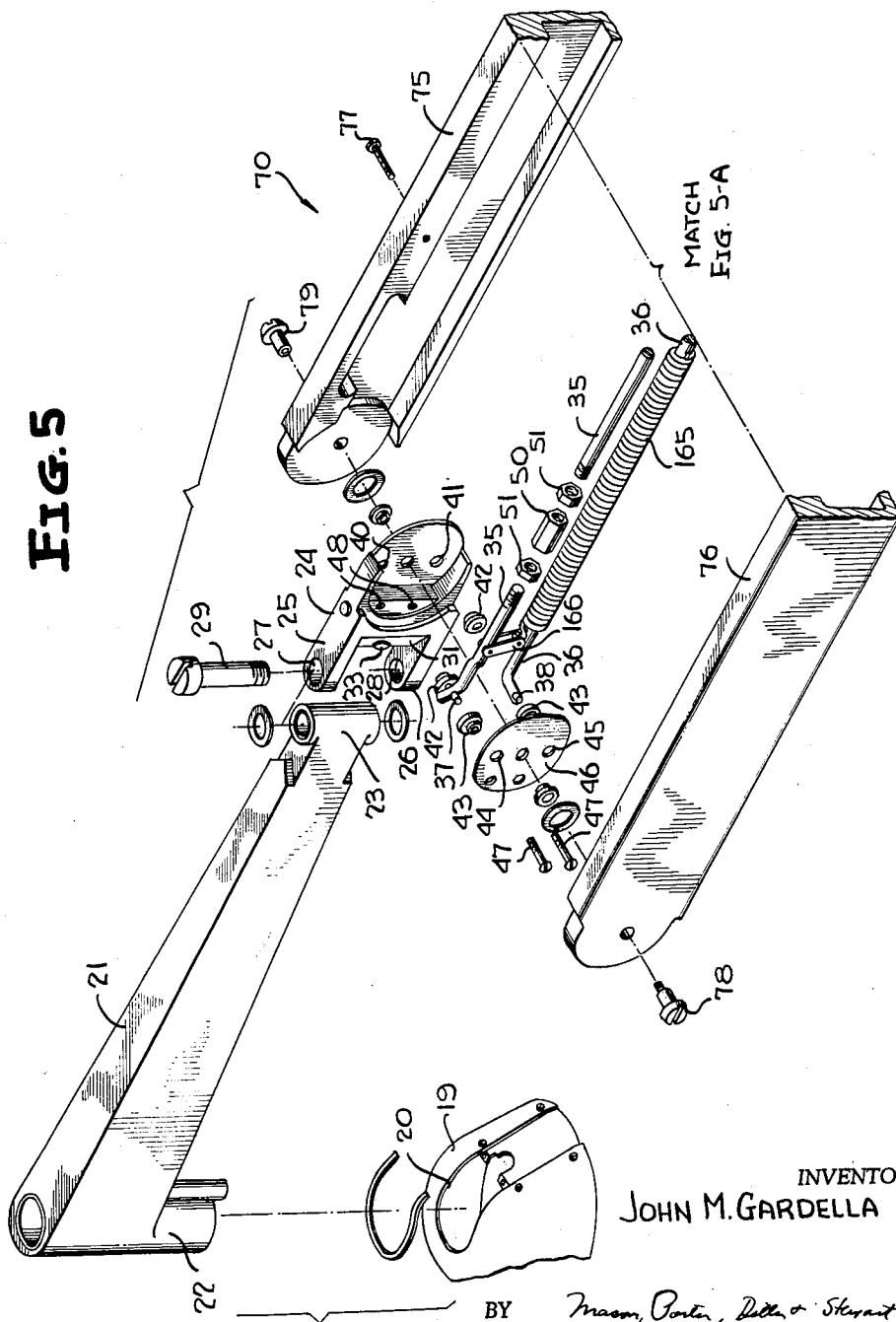
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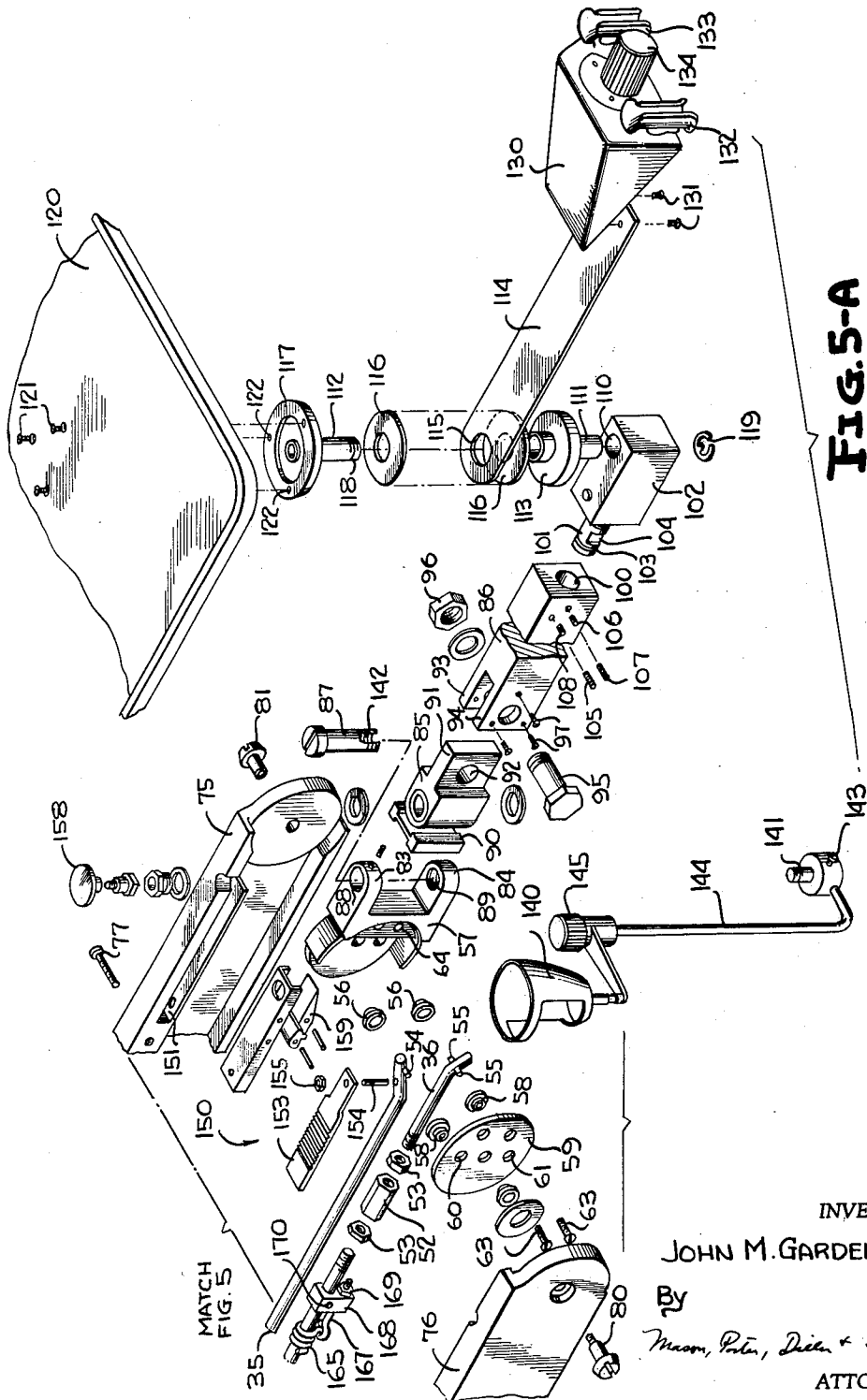
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FIG. 6

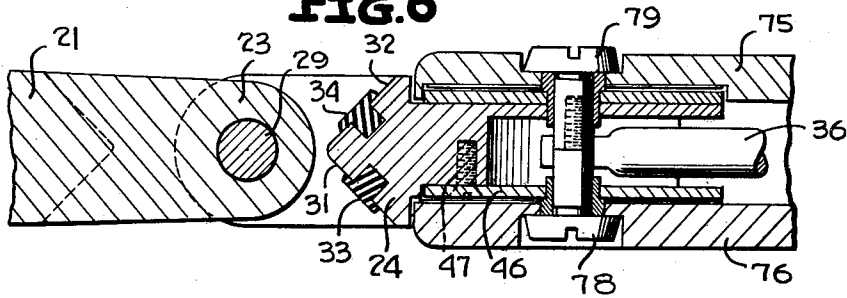


FIG. 7

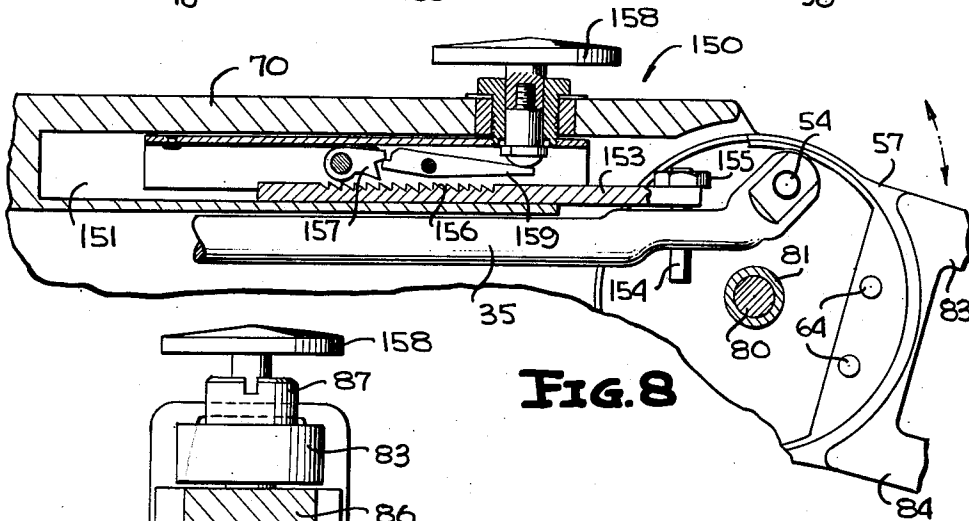
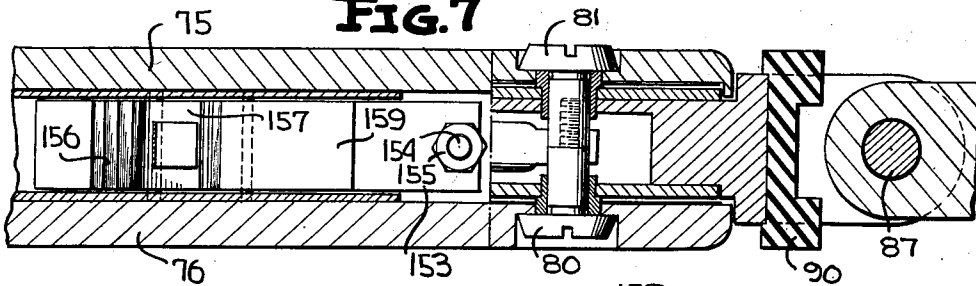


FIG. 8

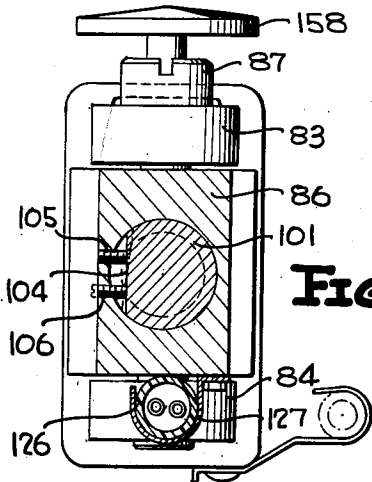


FIG. 9

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TRAY SUPPORT FOR A DENTAL UNIT

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11 Claims. (Cl. 248-124)

This invention relates to a new and novel adjustable support arm and more particularly to a support arm which is particularly adapted to be rotatably mounted on a conventional island stand as used in the practice of dentistry and the like.

It has long been customary to provide dental units with a tray for supporting handpieces, burs and other various instruments and equipment which are needed during treatment of a patient by a dentist. Previously known tray supports were generally mounted on a wall or ceiling or, in some instances, have been mounted on a dental unit but only a limited amount of possible adjustment being provided for.

It is rapidly becoming conventional for modern and progressive practitioners of dentistry to utilize adjustable reclining chair assemblies whereby the patient may be moved to various positions and, also, it is becoming conventional for the dentist to work while sitting on a seat which is adjustable relative to the patient's chair. Under such conditions, previously known types of adjustable supports for dental trays and other dental equipment do not include sufficient adjustability so as to be positioned at the most convenient location.

It is an object of this invention to provide an adjustable arm structure for supporting a dental tray, or the like, which may be suitably adjusted so as to position dental handpieces or other equipment at various convenient locations.

Another object of this invention is to provide an adjustable tray support which is adapted to be rotatably affixed to a conventional dental unit and includes a sweep arm mounted for pivotal movement about a vertical axis of a dental unit, a link lever and a tray arm. The link lever is provided with universal joints at inner and outer ends thereof for attaching the link lever to the sweep arm and the tray arm, respectively. The tray arm is maintained in a pre-set inclination by a parallelogram linkage that is confined in the link lever, and operatively attached to the universal joint.

Another object of this invention is to provide an adjustable tray support for a dental unit, the tray support comprising a radial sweep arm, means for mounting the sweep arm for horizontal rotation about a vertical axis of the dental unit, a first swing link, means for mounting the first swing link on the sweep arm for pivotal movement in a horizontal plane, a link lever having a first end and a second end, means connecting the first end of the link lever to the first swing link for pivotal movement in a vertical plane, a second swing link, means connecting the second swing link to the second end of the link lever for pivotal movement in a vertical plane, a tray arm, means connecting the tray arm to the second swing link for pivotal movement in a horizontal plane, and means for mounting a tray on the tray arm.

Another object of this invention is to provide an adjustable tray support, as described above, further characterized in that the means for mounting a tray on the tray arm comprises a mounting block having a post fixed there-

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to, a bore formed in the tray arm, the post being loosely receivable within the bore, spaced adjustment means for adjustably positioning the block and post in a vertical plane, lock means for locking the block and post to the tray arm, and means on the block for pivotally mounting a tray for rotation in a horizontal plane.

Another object of this invention is to provide the foregoing adjustable tray support with a parallelogram linkage including a pair of parallel links, each of the links having one end thereof mounted in the first swing link and the other end thereof mounted in the second swing link.

Another object of this invention is to provide the foregoing tray support with lock means which are operatively disposed between the link lever and one of the pair of parallel links to prevent movement therebetween.

Another object of this invention is to provide an adjustable tray support with the foregoing lock means wherein the lock means include a ribbed lock piece, means for mounting the ribbed lock piece on one of the parallel links, a lock pawl, means mounting the lock pawl on the link lever adjacent the ribbed lock piece, and means on the link lever for engaging and disengaging the lock pawl with the ribbed lock piece.

Another object of this invention is to provide the foregoing adjustable tray support with counterbalance means which are operatively associated with the parallel links to bias the tray arm toward an upper position.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a plan view of the present invention and illustrates an adjustable tray support which is pivotally mounted to a conventional dental unit.

FIGURE 2 is an elevational view of the adjustable tray support and dental unit, and illustrates various positions for the adjustably mounted tray.

FIGURE 3 is a vertical sectional view, taken on line 3-3 of FIGURE 1, and illustrates the universal connection between the radial sweep arm and the link lever.

FIGURE 3A is a vertical sectional view, taken on line 3A-3A of FIGURE 1, and illustrates the universal connection between the link lever and the tray arm, and also illustrates lock means for preventing relative movement between the link lever and the parallel link.

FIGURE 4 is an enlarged vertical sectional view, taken on line 4-4 of FIGURE 3, and shows the connection of the parallel links to the first swing link.

FIGURES 5 and 5-A are exploded perspective views showing the relationship of the various elements of the adjustable tray support.

FIGURE 6 is an enlarged horizontal sectional view taken on line 6-6 of FIGURE 3.

FIGURE 7 is an enlarged horizontal sectional view taken on line 7-7 of FIGURE 3-A.

FIGURE 8 is an enlarged vertical sectional view, similar to FIGURE 3-A, and illustrates the locking mechanism in released position so as to allow movement between the link lever and the second swing link.

FIGURE 9 is a vertical sectional view, taken on line 9-9 of FIGURE 3-A, and shows the adjustable mounting between the tray arm and the mounting block.

Referring to the drawings in detail, and more particu-

larly to FIGURES 1 and 2, there is illustrated a dental unit or dental island, generally indicated by the numeral 10, which dental unit 10 is provided with a new and novel adjustable tray support, which is generally indicated by the numeral 11.

The dental unit 10 includes a conventional cuspidor 12, syringe 13, saliva ejector 14, temperature control knobs 15 and a water niche 16. In addition, the dental unit 10 is provided with a vertically disposed, fixed pivot post 17, upon which the adjustable tray support 11 is pivotally mounted for rotation in a horizontal plane through an arc of approximately 350 degrees, as is indicated by the arc 18 in FIGURE 1. A dome or dust cover 19 has an opening 20 therein, as is shown in FIGURE 5, for receiving one end of a radial sweep arm 21 such that the dome 19 and sweep arm 21 rotate about the vertical axis of the post 17.

As is most clearly shown in FIGURE 5, the radial sweep arm 21 includes a tubular post 22 for mounting the sweep arm 21 upon the pivot post 17. The other end of the sweep arm 21 is provided with a tubular post 23 for pivotally connecting the sweep arm 21 to a first swing link 24. The first swing link 24 has a pair of arms 25 and 26 having a smooth bore 27 and a threaded bore 28, respectively. The swing link 24 is connected to the tubular post 23 by a bolt 29 and is rotatable in a horizontal 270 degree arc as at 30 in FIGURE 1. As is clearly shown in FIGURE 6, the first swing link 24 includes a pair of surfaces 31 and 32 which are provided with rubber cushion elements 33 and 34 which engage with the radial sweep arm 21 to limit the pivotal movement of the swing link 24 about the vertical axis of bolt 29.

A pair of parallel links 35 and 36 are provided with end pivots 37 and 38, respectively, for pivotally connecting the links 35 and 36 to the first swing link 24. The first swing link 24 includes a pair of vertically disposed openings 40 and 41 for receiving bushings 42 and the end pivots 37 and 38, respectively. The end pivots 37 and 38 are also provided with bushings 43 which are received in vertically disposed openings 44 and 45 in a mounting plate 46. The mounting plate 46 is fixedly secured to the swing link 24 by a pair of threaded fasteners 47 which screw into threaded bores 48 in the swing link 24. The parallel link 35 includes a turn-buckle 50 and a pair of lock nuts 51, as is shown in FIGURE 5, and the parallel link 36 includes a turn-buckle 52 and a pair of lock nuts 53, as is shown in FIGURE 5-A. The ends of the parallel links 35 and 36 opposite to the end pivots 37 and 38 are provided with end pivots 54 and 55, respectively. Bushings 56 are provided for mounting the end pivots 54 and 55 on a second swing link 57, and bushings 58 are provided for mounting the end pivots 54 and 55 on a mounting plate 59 in a pair of openings 60 and 61. The mounting plate 59 is secured to the swing link 57 by a pair of headed fasteners 63 which are received in the threaded bores 64.

Referring to FIGURE 2, a link lever 70 has a first end 71 which is pivotally connected to the first swing link 24 for rotation in a vertical plane about a horizontal pivot 72. The link lever 70 has a second end 73 which is pivotally connected to the second swing link 57 and pivots relative thereto about a horizontal axis 74.

As is apparent in FIGURE 2, the position of the link lever 70 may be varied by rotation of the lever 70 about the pivot 72, but the inclination of the second swing link 57 remains constant, with respect to the horizontal, because of the action of the parallel links 35 and 36. As is shown in FIGURE 5, the link lever 70 includes a pair of sides 75 and 76 which may be secured together by a threaded fastener 77. The sides 75 and 76 are also joined together by a threaded bolt 78 and a nut 79 which mount the link lever 70 to the first swing link 24. The sides 75 and 76, of the link lever 70, are attached to the second swing link 57, for rotation relative

thereto, by a bolt 80 and a nut 81. It will be apparent from consideration of FIGURE 8 that the second swing link 57 may be initially positioned relative to the link lever 70 by manipulation of the turn-buckles 50 and 52 on the parallel links 35 and 36. It is, of course, desirable that the turn-buckles 50 and 52 be used to vary the length of the parallel links 35 and 36 such that the arms 83 and 84, of the swing link 57, are disposed horizontally and in vertical alignment with each other.

A yoke member 85 links the second swing link 57 to a tray arm 86. A bolt 87 passes through an opening 88, in the arm 83, and threads into the bore 89 in the arm 84. The yoke member 85 is freely pivoted on the bolt 87 and can swing in an arc of 180 degrees as is shown in FIGURE 1. A rubber cushion or pad 90 may be adhesively secured to the second swing link 57 to provide a resilient stop for the yoke member 85. The yoke member 85 has a projecting arm 91 having a bore 92 there-through. The arm 91 is received between the fork arms 93 and 94, on the tray arm 86, and fixedly secured thereto by a bolt 95 and a nut 96. The arms 93, 94 and 91 are of such length that the tray arm 86 may be adjustably positioned about the axis of the bolt 95 through an arc of approximately ten degrees. After the tray arm 86 is adjusted relative to the yoke member 85, the nut and bolt 96 and 95 are tightened to press the arms 93 and 94 against the arm 91. In addition, three set screws 97 are provided for each of the arms 93 and 94 to assist the lock bolt 95 and nut 96 to rigidly hold the tray arm 86 in its adjusted position relative to the yoke member 85.

The tray arm 86 has a cylindrical bore 100 for receiving a post 101 which is attached to a mounting block 102. The post 101 is provided with a pair of annular grooves 103 and a flat 104, as is best shown in FIGURES 3-A and 5-A. The post 101 and the mounting block 102 may be adjustably rotated about the longitudinal axis of the tray arm 86 by a pair of vertically aligned adjustment screws 105 and 106. As is clearly shown in FIGURE 9, the post 101 may be rotated clock-wise by slightly withdrawing the screw 106 and then tightening up on the screw 105. After the screws 105 and 106 have been used to adjust the position of the mounting block 102, a pair of horizontally disposed lock screws 107 and 108 are tightened up and enter the grooves 103 and prevent rotation of the post 101 and the mounting block 102.

The mounting block 102 has a vertical bore 110 for receiving a sleeve 111 and a stud 112. The sleeve 111 is provided with a collar 113 which engages the top surface of the mounting block 102. A support arm 114 has an aperture 115 and, along with a pair of washers 116, is mounted on the sleeve 111 so as to rest upon the collar 113. A mounting plate 117 is connected to the stud 112 which includes an annular locking groove 118. A lock washer 119 may be positioned within the groove 118 such that the mounting plate 117 and the collar 113 cooperate to frictionally grip the support arm 114. A small manual force is all that is needed to rotate the support arm 114 about the axis of the bore 110.

A tray 120 is attached to the mounting plate 117 by a plurality of screws 121 which are threaded into bores 122 in the mounting plate 117. While the tray 120 is shown in the drawings as being rectangular, it is to be understood that other forms of work trays may be so mounted and may, if desired, possibly house retraction reels for instruments and other related components.

It is conventional for dentists to use two separate handpieces, such as the handpiece 125, as is shown in FIGURE 2. Usually, these handpieces are air-driven by air which is supplied through fluid lines 126 which are secured to the underside of the adjustable tray support 11 by cover plates 127. The fluid lines 126 lead to a housing 130 which is connected to the support arm 114 by a pair of threaded fasteners 131. A pair of split sleeves 132 and 133 are mounted on the housing 130 on opposite sides of a speed-control knob 134. The knob 134 operates a valve, not

shown, which is contained within the housing 130. A high speed handpiece may be mounted in the sleeve 132 and a low speed handpiece may be mounted in the sleeve 133, and these handpieces may be positioned at the most convenient location by varying the position of the support arm 114 relative to the tray 120 and dental unit 10, as is shown in FIGURE 1.

A Bunsen burner 140 is preferably positioned adjacent to the tray 120. As is shown in FIGURE 5-A, a threaded fitting 141 cooperates with internal threading 142 on the bolt 87. If so desired, the threading 89 in the arm 84 may be omitted. A gas port 143 is provided for feeding a combustible gas to the conduit 144, which gas is preferably controlled by an adjustable needle valve, not shown, which is connected to a control knob 145.

A lock means, generally indicated by the numeral 150, is disposed within a cavity 151 formed in the side 75 of the link lever 70. The locking means 150 includes a ratchet or ribbed lock piece 153 which is attached to the parallel link 36 by a threaded pin 154 and a nut 155. The lock piece 153 has inclined teeth 156, as it shown in FIGURE 8, such that a locking pawl 157 may freely ride up the inclined surfaces of the teeth 156 during upward movement of the link lever 70 and tray 120. In order to lower the tray 120, it is necessary to depress a knob 158 so as to pivot a lift lever 159 and lift the locking pawl 157 above the teeth 156.

The weight of the tray 120, handpiece 125, etc. is counterbalanced by a tension spring 165 which is coiled around the parallel link 36. One end of the spring 165 is connected to the parallel link 35 by a pivoted link 166, while the other end of the spring 165 is provided with a threaded hook 167 which is adjustably positioned in a block 168 by a nut 169. The block 168 may be adjustably positioned along the parallel link 36 and affixed thereto by a set screw 170, as is shown in FIGURE 5-A, to provide a coarse adjustment for the tension in spring 165. The nut 169 then provides for a fine adjustment of the tension in spring 165.

It is apparent from the foregoing that there has been provided an adjustable tray support which is adapted to be mounted upon a conventional dental unit for horizontal, vertical and radial adjustment of a tray, and in addition, means have been provided for locating conventional handpieces in convenient locations.

While preferred forms and arrangement of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in details and arrangement of parts may be made without departing from the spirit and scope of the invention as defined in the appended claimed subject matter.

I claim:

1. In combination; a dental unit having a vertical axis, and an adjustable tray support, said tray support comprising a radial sweep arm, means for mounting said sweep arm for horizontal rotation about the vertical axis of said dental unit, a first swing link, means for mounting said first swing link on said sweep arm for pivotal movement in a horizontal plane, a link lever having a first end and a second end, means connecting said first end of said link lever to said first swing link for pivotal movement in a vertical plane, a second swing link, means connecting said second swing link to said second end of said link lever for pivotal movement in a vertical plane, a tray arm, means connecting said tray arm to said second swing link for pivotal movement in a horizontal plane, and means for mounting a tray on said tray arm.

2. The combination as defined in claim 1 further characterized in that said means for mounting a tray on said tray arm comprises a mounting block having a post fixed thereto, a bore formed in said tray arm, said post being loosely receivable within said bore, spaced adjustment means for adjustably positioning said block and post in a vertical plane, lock means for locking said block

and post to said tray arm, and means on said block for pivotally mounting a tray for rotation in a horizontal plane.

3. The combination as defined in claim 1 including a pair of parallel links, each of said links having one end thereof mounted in said first swing link and the other end thereof mounted in said second swing link.

4. The combination as defined in claim 3 wherein lock means are provided between said link lever and one of said pair of parallel links to prevent movement therebetween.

5. The combination as defined in claim 3 wherein counterbalance means are provided on said parallel links to bias said tray arm toward an upper position.

6. The combination as defined in claim 3 including a ribbed lock piece, means for mounting said ribbed lock piece on one of said parallel links, a locking pawl, means pivotally mounting said locking pawl on said link lever adjacent to said ribbed lock piece, and means on said link lever for engaging and disengaging said locking pawl with said ribbed lock piece.

7. An adjustable support arm comprising a radial sweep arm, means for mounting said arm for rotation in a fixed plane, a first swing link, means for mounting said first swing link on said radial sweep arm for pivotal movement in said fixed plane, a second swing link, a link lever, said link lever connecting said first swing link to said second swing link, a pair of parallel links, one end of each of said parallel links being pivotally mounted on said first swing link, the other end of each of said parallel links being pivotally mounted on said second swing link, a ribbed lock piece, means mounting said ribbed lock piece on one of said parallel links, a pawl, means pivotally mounting said pawl on said link lever adjacent to said ribbed lock piece, and means on said link lever for moving said pawl into and out of engagement with said ribbed lock piece.

8. An adjustable support arm comprising a radial sweep arm, means for mounting said arm for rotation in a fixed plane, a first swing link, means for mounting said first swing link on said radial sweep arm for pivotal movement in said fixed plane, a second swing link, a link lever, said link lever connecting said first swing link to said second swing link, a pair of parallel links, one end of each of said parallel links being pivotally mounted on said first swing link, the other end of each of said parallel links being pivotally mounted on said second swing link, a ribbed lock piece, means mounting said ribbed lock piece on one of said parallel links, a pawl, means pivotally mounting said pawl on said link lever adjacent to said ribbed lock piece, and means on said link lever for moving said pawl into and out of engagement with said ribbed lock piece, a coil spring, means connecting said spring to one of said parallel links, adjustable means for connecting said spring to the other of said parallel links to provide counterbalance means for biasing said link lever toward a predetermined position, said ribbed lock piece having teeth formed thereon, said pawl being freely movable over said teeth during movement of said link lever toward said predetermined position.

9. An adjustable support comprising a support arm and a mounting block, a bore formed in said support arm, a post affixed to said mounting block, said post being receivable within said bore, spaced adjustment means for adjustably positioning said mounting block and post relative to said support arm, lock means for locking said block and post to said arm, and means for supporting an article on said mounting block.

10. A device as defined in claim 9 wherein said bore is substantially cylindrical and coaxial with the longitudinal axis of said support arm, said spaced adjustment means comprising a first pair of set screws disposed in a first plane, said lock means comprising a second pair of set screws disposed in a second plane, said first plane

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defining an angle with said longitudinal axis, and said longitudinal axis being disposed in said second plane.

11. A device as defined in claim 9 wherein said last named means includes a second support arm, means mounting said second support arm on said block for rotation in a horizontal plane, and means on said second support arm for mounting tools.

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