Oct. 24, 1967 W. JUNKEL ETAL 3,348,799

TRAY ASSEMBLY

Filed Nov. 1, 1965

FIG. 1

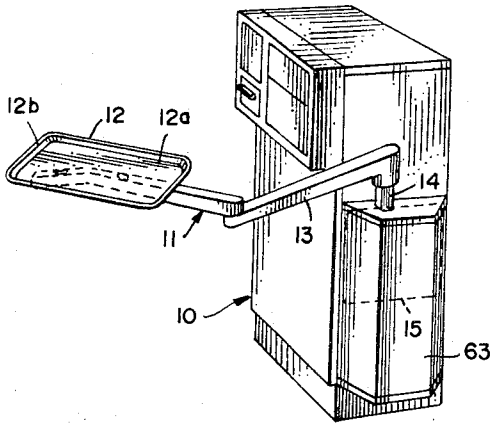


FIG. 4

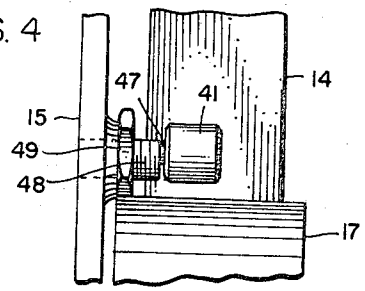


FIG. 2

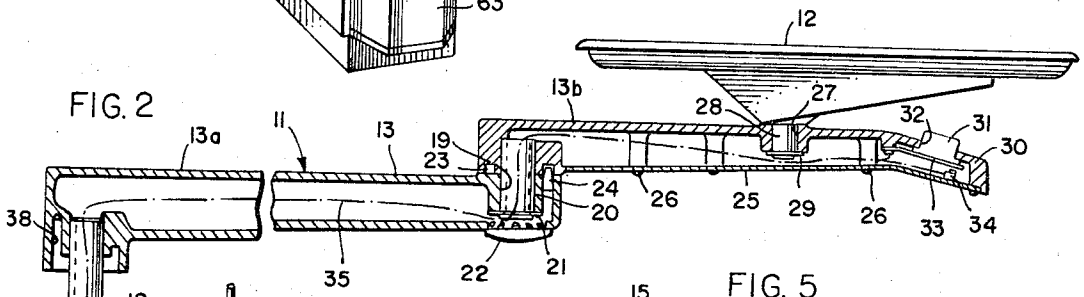


FIG. 5

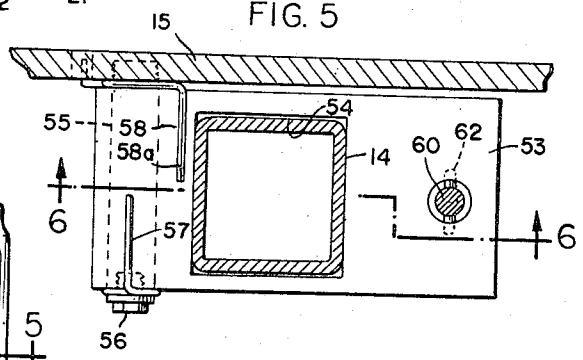


FIG. 3

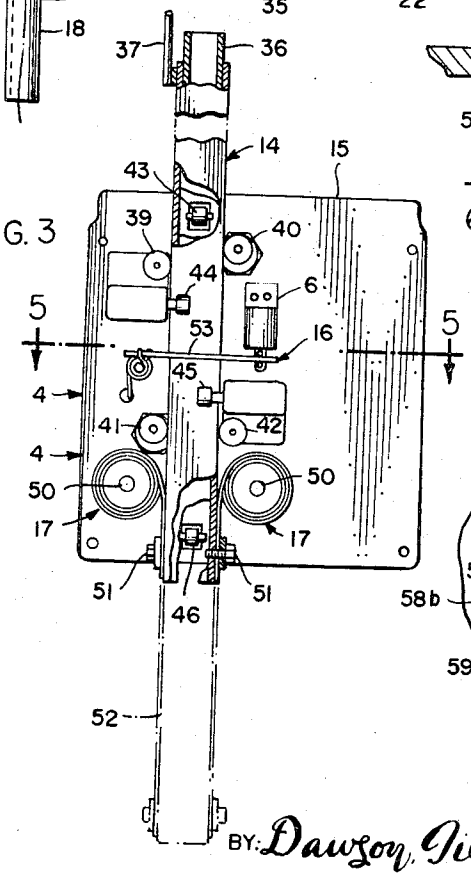
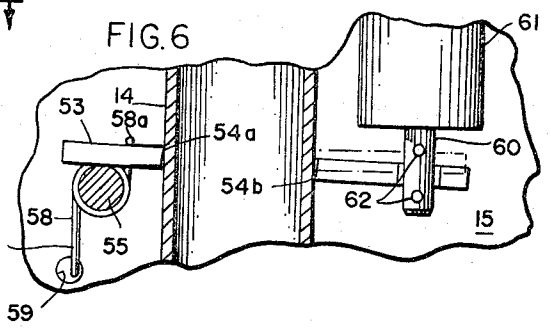


FIG. 6



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TRAY ASSEMBLY

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ABSTRACT OF THE DISCLOSURE

A tray assembly for dental consoles, the assembly including an upstanding post, a horizontal arm connected at one end to the upper portion of the post, and a tray disposed at the arm's free end. A handle is provided at the free end of the arm for raising and lowering the assembly. The assembly is counterbalanced by a counterbalancing spring arrangement connected to the post, and a locking device, releasable by a remote control adjecent the tray, prevents unintentional downward movement of the assembly.

This invention relates to a tray assembly, and more specifically, to an improved instrument tray assembly particularly suitable for use in dentists' offices, hospitals, and the like.

It is an object of the present invention to provide a tray arm assembly which permits an operator to extend or retract the tray horizontally, or shift it laterally, into any selected horizontal position, and raise or lower it to any desired elevation. In this connection, it is a specific object to provide an arm assembly having an operating handle portion which is readily accessible to the operator and by which he may quickly and simply shift the tray in any desired direction. An additional object is to provide such an assembly with an operating handle portion which is immediately adjacent to the tray itself, thereby greatly facilitating the selective positioning of the tray by an operator.

A further object is to provide a tray arm assembly which is normally locked against downward movement but which may be shifted upwardly at any time, within its range of vertical movement, simply by exerting an upward force on the tray or its supporting arm. Thus, in the event that the tray projects over the armrest or other portion of a dental chair, there is no danger of injury to a patient should the chair be elevated without first shifting the tray out of the way.

A still further object is to provide an assembly with simple but highly effective locking means for positively and automatically locking the tray arm against downward movement, and with means for selectively releasing such locking means when lowering of the tray arm is desired.

Other objects will appear from the specification and drawings in which:

FIGURE 1 is a perspective view of a dental console equipped with a tray arm assembly embodying the present invention;

FIGURE 2 is a broken side elevational view with the tray arm illustrated in longitudinal section to reveal the internal construction thereof;

FIGURE 3 is an elevational view, shown partly in section, of the mounting panel and post for the tray arm assembly;

FIGURE 4 is an enlarged broken elevational view taken along line 4—4 of FIGURE 3;

FIGURE 5 is an enlarged horizontal sectional view taken along line 5—5 of FIGURE 3;

FIGURE 6 is an enlarged vertical sectional view taken along line 6—6 of FIGURE 5.

Referring to FIGURE 1, the numeral **10** generally designates a dental cabinet or console equipped with a

tray arm assembly **11** embodying the present invention. The console houses the power-driven hand pieces used for dental work and is intended to be positioned in close proximity to a conventional dental chair. Since the console is ordinarily stationary, and since the tools and supplies supported by tray **12** should be within easy reach of the dentist for any given operating position, or for any given inclination or elevation of the dental chair, it is important that the tray be shiftable horizontally and vertically into any of a variety of selected positions. It is to be understood, however, that while the tray arm assembly is illustrated in combination with a dental console, the assembly may, if desired, be supported upon other types of cabinets or surfaces.

The tray arm assembly **11** essentially comprises a tray **12**, a jointed horizontal arm **13**, a standard or support post **14**, a mounting panel **15**, and releasable locking means **16**. The combination also includes counterbalancing means **17** operatively associated with the mounting panel and post to facilitate vertical positioning of the tray arm.

The tray arm, shown most clearly in FIGURE 2, includes jointed sections **13***a* and **13***b*. The proximate section **13***a* is hollow and is equipped at its proximate end with a depending hollow pivot shaft **18**. At its remote end, arm section **13***a* provides an upwardly-opening socket **19** for rotatably receiving the lower end of a vertical and hollow pivot shaft **20**. The upper end of shaft **20** is rigidly secured to the proximate end of outer arm section **13***b*.

The two arm sections are therefore fitted together for pivotal movement about the vertical axis of shaft **20**. In the illustration given, the lower end of shaft **20** is grooved circumferentially and a conventional C-ring **21** is received within the groove to secure the parts together. A removable access cap **22** is frictionally fitted within an opening in the undersurface of inner arm section **13***a* and may be removed from that arm to expose shaft **20** and locking ring **21** directly thereabove.

In some installations it may be desirable to limit the extent of pivotal movement of the two arm sections in order to prevent the outer or distal section **13***b*, or the tray **12** supported thereon, from striking cabinet **10**. This may be achieved by forming a C-shaped groove **23** in the surface of one of the arm sections **13***b* and about shaft **20**, and securing a pin **24** in the other arm section **13***a*. The upwardly projecting end of pin **24** rides in groove **23** and the circumferential limits of that groove control the extent of pivotal movement of the arm sections with respect to each other.

Like inner arm section **13***a*, outer section **13***b* is hollow. If desired, the bottom wall **25** of the outer arm section may be removable, being secured to the remainder of the arm section by screws **26**. The top wall of section **13***b* is provided intermediate its ends with an upwardly facing socket **27** which pivotally or rotatably receives a downwardly extending pin **28** provided by tray **12**. A locking ring **29**, received within a circumferential groove in the lower end of pin **28**, maintains the pin of the tray within its socket.

The tray **12** has a flat, horizontal upper surface **12***a* surrounded by an upwardly and outwardly sloping rim **12***b* (FIGURE 1). While the tray is shown to be of generally rectangular shape, it is to be understood that other tray configurations may be provided.

At the distal or free end of outer arm section **13***b* is an integral handle portion **30**. As shown in FIGURE 2, handle portion **30** slopes downwardly and outwardly. The downward inclination of the handle portion facilitates manipulation of the tray arm and renders control button **31** more accessible to an operator. The control button projects upwardly through an opening **32** in the upper surface in the top wall of handle portion **30** and is normally maintained in raised position by a spring contact

arm 33 disposed within the hollow handle section. Depression of button 31 urges arm 33 into electrical contact with contact member 34, thereby closing the electrical circuit which energizes the lock releasing means to be described shortly. As indicated schematically by broken line 35 in FIGURE 2, the leads for the control button extend through the hollow arm sections 13*a* and 13*b*, and through hollow pivot shafts 18 and 20. It will be observed that the stop means afforded by pin 24 and groove 23 prevent damage to the wires which might otherwise be caused by unlimited pivoting or rotating of the arm sections in the same direction about the axis of pivot shaft 20.

The depending pivot shaft 18 of the jointed tray arm is rotatably received within a sleeve 36 at the upper end of support post or standard 14. The sleeve serves as an adaptor for the cylindrical pivot shaft since the post, as shown most clearly in FIGURE 5, is of square cross sectional configuration. To prevent excessive rotation of the arm, which might result in damage to either the arm or the cabinet, or to the wires passing through pivot shaft 18, post 14 is provided at its upper end with an upstanding pin 37 which is received within a circumferentially-incomplete groove 38 in the undersurface of arm section 13*a*.

The post is carried for vertical movement by a plurality of rollers mounted upon panel 15. A set of four rollers 39–42 is positioned and arranged to prevent horizontal movement of the post in directions parallel with panel 15, and another set of four rollers 43–46 is positioned and arranged to engage the remaining two sides of the post and thereby prevent horizontal movement of the post in directions normal to the panel. To eliminate looseness or play, certain of the rollers may be adjustably mounted. Thus, roller 41, as illustrated in FIGURE 4, is supported upon an axle 47 which is eccentrically disposed with respect to threaded shaft 48. The shaft is in turn threadedly mounted on panel 15. To reset the roller, locking nut 49 is loosened and shaft 48 is then rotated until the roller bears snugly against post 14. Nut 49 is then retightened to hold the roller in its position of adjustment.

The counterbalancing means for the assembly comprises a pair of constant force roll springs 17 carried upon spindles 50 which are secured to the panel 15 on opposite sides of post 14. The free ends of the springs are secured to the lower end portion of the post by screws 51, and the combined, substantially constant tension exerted by the springs in their effort to return to coiled condition imposes an upward force on the post which is substantially the same, or only slightly less than, the combined weight of the post 14, jointed tray arm 13, and tray 12. The post is shown in solid lines in FIGURE 3 in its fully raised position. Broken lines 52 in the same figure illustrate the post in a lowered position.

The releasable locking means 16 for locking the post against downward movement comprises a generally horizontal plate 53 which has a central opening 54 through which the post extends. Opening 54 is of the same square shape as the cross sectional configuration of the post; however, its horizontal dimensions are slightly greater than the outer cross sectional dimensions of the post.

When the plate lies in a plane normal to the axis of the post, its edges which define opening 54 are spaced from the post's outer surface. However, if the plate is positioned at a slight angle from the horizontal, the edges along a pair of opposite sides of the opening thereof will engage the post and will restrain downward movement of that post.

Referring to the enlarged views of FIGURES 5 and 6, it will be seen that plate 53 rests upon a horizontal pivot shaft 55 secured to panel 15. A headed retaining screw 56 retains a spring member 57 which projects over plate 53 and which holds the plate upon the support shaft. Since the horizontally elongated plate is supported only at one end upon shaft 55, the weight of the plate's unsupported end portion normally causes the plate to assume the

downwardly inclined position illustrated in solid lines in FIGURE 6. When the plate is so inclnied, the upper edge 54*a* along one side of opening 54 bears tightly against one side of the post and, since a downward force exerted upon the post would only increase the force of contact between edge 54*a* and the post's outer surface, the tray arm assembly is effectively locked against downward movement. It will also be noted that the opposite side of the post is engaged by lower edge 54*b* on the other side of opening 54. Therefore, when the plate is in its downwardly inclined position, the post is effectively wedged between edges 54*a* and 54*b*.

While the weight of the plate tends to urge it into its downwardly inclined position, a spring 58 may be provided to exert additional downward force and thereby insure proper operation of the locking means. The intermediate portion of spring 58 encircles support post 55. One horizontally-turned end portion 58*a* of the spring bears against the upper surface of the plate to urge it downwardly, and the other end portion 58*b* of the spring is hooked in an opening 59 in mounting panel 15.

The locking plate, when in its downwardly inclined position, effectively anchors the post and tray arm assembly against downward movement. At the same time, it does not significantly restrain the post against upward movement, since an upward force exerted upon the post would simply restore the plate to the horizontal position illustrated in broken lines in FIGURE 6. In other words, upward movement of the post and its associated parts automatically relieves the welding action of the locking plate.

The plate is apertured adjacent its free edge and the plunger 60 of solenoid 61 extends downwardly through such aperture. Transverse pins 62 extend through the plunger and operatively interconnect the plunger and plate. The solenoid is rigidly secured to panel 15 and is electrically connected to control button 31. When the solenoid is energized, plunger 60 travels upwardly to shift plate 53 into the raised position illustrated in broken lines in FIGURE 6; that is, into a position wherein the plate is normal to the axis of post 14 and thereby permits free movement of the post in upward and downward directions through opening 54.

As previously indicated, spring member 57 restricts the locking plate against upward movement off of support shaft 55. Should slight frictional forces develop between the plate 53 and post 52 as the tray arm is raised, spring 57 will effectively prevent the plate from shifting into a position in which it might lock the post against such upward movement.

In the illustration given, panel 15 is rigidly secured to the side wall of console cabinet 10, as indicated in FIGURE 1. A protective cover 63 extends over the panel and projects downwardly a substantial distance therebelow to conceal the panel and the operating mechanism supported thereby.

From the foregoing, it is believed apparent that the structure of the present invention constitutes a highly effective tray support arm assembly which may be easily and quickly shifted by an operator in a variety of horizontal directions to suit the convenience of a dentist or other user. Should the dentist desire to lower the tray, he need only grip handle portion 30, depress button 31, and then urge the tray downwardly. Despite the length of the effective lever arm afforded by the extended arm sections 13*a* and 13*b*, there is no possibility that a downward force so applied against handle portion 30 will cause jamming of post 14 because of the anti-friction mounting of that post and because of the counterbalancing effect of springs 17.

To raise the tray, the dentist need only urge the arm or tray upwardly. Since the post 14 is not restrained against upward movement by locking plate 53, it is unnecessary to depress control button 31. For the same reason, should a dentist inadvertently fail to shift the tray out of the way before adjusting a dentail chair into a raised position,

there is no danger that a patient might be injured by being squeezed between the chair and the undersurface of the tray arm assembly.

While in the foregoing we have disclosed an embodiment of the present invention in considerable detail for purposes of illustration, it will be understood by those skilled in the art that many of these details may be varied without departing from the spirit and scope of the invention.

We claim:

1. A tray arm assembly comprising a mounting panel adapted to be secured to a dental console; a vertical post having flat sides and being of uniform horizontal cross section throughout substantially its entire vertical extent; a plurality of rollers secured to said panel and engaging said post for guiding movement of said post between raised and lowered positions; said rollers being arranged in vertically-spaced pairs; each of said pairs engaging one of the flat sides of said post; a locking plate having an opening through which said post extends; said opening being slightly larger than the outside cross-sectional dimensions of said post to permit unrestrained vertical movement of the post therethrough when said locking plate is generally horizontally disposed; said locking plate being mounted upon said panel for limited pivotal movement between a generally horizontal position and a normal downwardly inclined position in which edge portions of said locking plate engage the outer surface of said post to prevent downward movement of the post relative to said locking plate; a horizontally-elongated tray arm having one end thereof affixed to the upper portion of said post and having a tray mounted adjacent the opposite free end of said arm; gripping means provided adjacent said free end of said arm for the manual shifting of said tray, tray arm, and post upwardly and downwardly as a unit; power-operated releasing means mounted upon said panel for moving said locking plate into its generally horizontal position; and control means adjacent said gripping means for actuating said power releasing means to pivot said locking plate into its generally horizontal position when downward movement of said tray, tray arm, and post is desired.

2. The structure of claim 1 in which said gripping means comprises a handle portion provided by said support arm adjacent the free end thereof.

3. The structure of claim 1 in which said power releasing means includes a solenoid having a plunger operatively associated with said plate for raising the locking plate into its generaly horizontal position when said solenoid is energized.

4. The structure of claim 3 in which said control means comprises a manually-operable switch in circuit with said solenoid for actuating the same, said switch being located upon said gripping means adjacent the free end of said arm.

5. The structure of claim 1 in which spring counterbalancing means are connected to said panel and to said post for exerting an upward force on said post to offset at least a substantial portion of the combined weight of said post, tray arm, and tray, said counterbalancing means comprising at least one constant-force roll spring mounted upon said panel and having one end thereof connected to said post.

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