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[54] **OVERHEAD EQUIPMENT CONTROL APPARATUS
 FOR OPERATING ROOMS**
 10 Claims, 23 Drawing Figs.

[52] U.S. Cl. **248/333,**
 137/355.16; 312/247
 [51] Int. Cl. **A61b 19/00**
 [50] Field of Search 248/323,
 327, 333, 338; 312/247, 223, 206; 52/29.39;
 187/25; 137/355.16; 250/91

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ABSTRACT: An overhead multipurpose equipment control apparatus for surgical operating rooms in which an overhead stationary housing supported from a ceiling structure includes a vertically adjustable control member provided with a multisection laterally movable instrument supporting means, said overhead housing also supporting a relatively movable service or auxiliary housing, said housings and said laterally movable instrument arm including control means whereby a surgeon and his assistants may conveniently control various selected equipment and instruments while in a zone surrounding a surgical table, the zone being free from usual stands, tables, and operating room equipment normally clustered about an operating table.

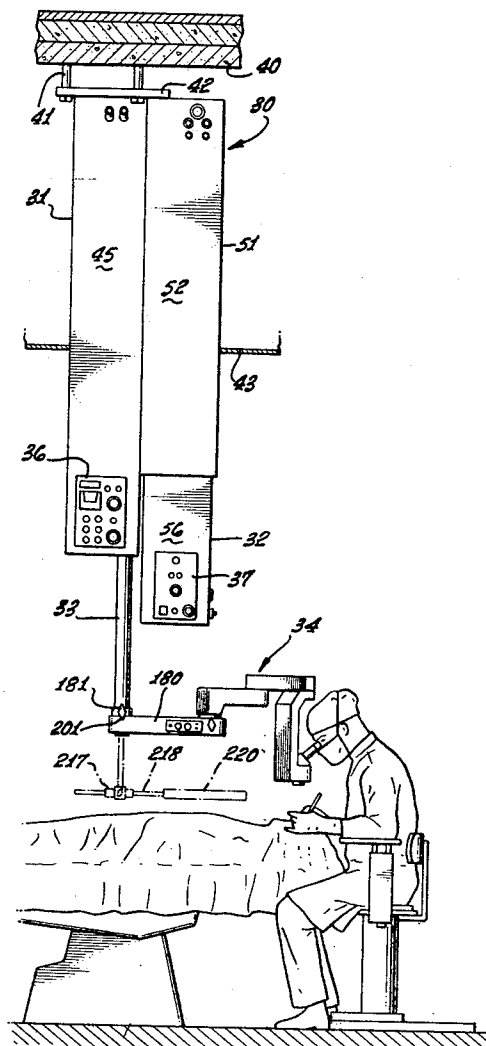


FIG. 1.

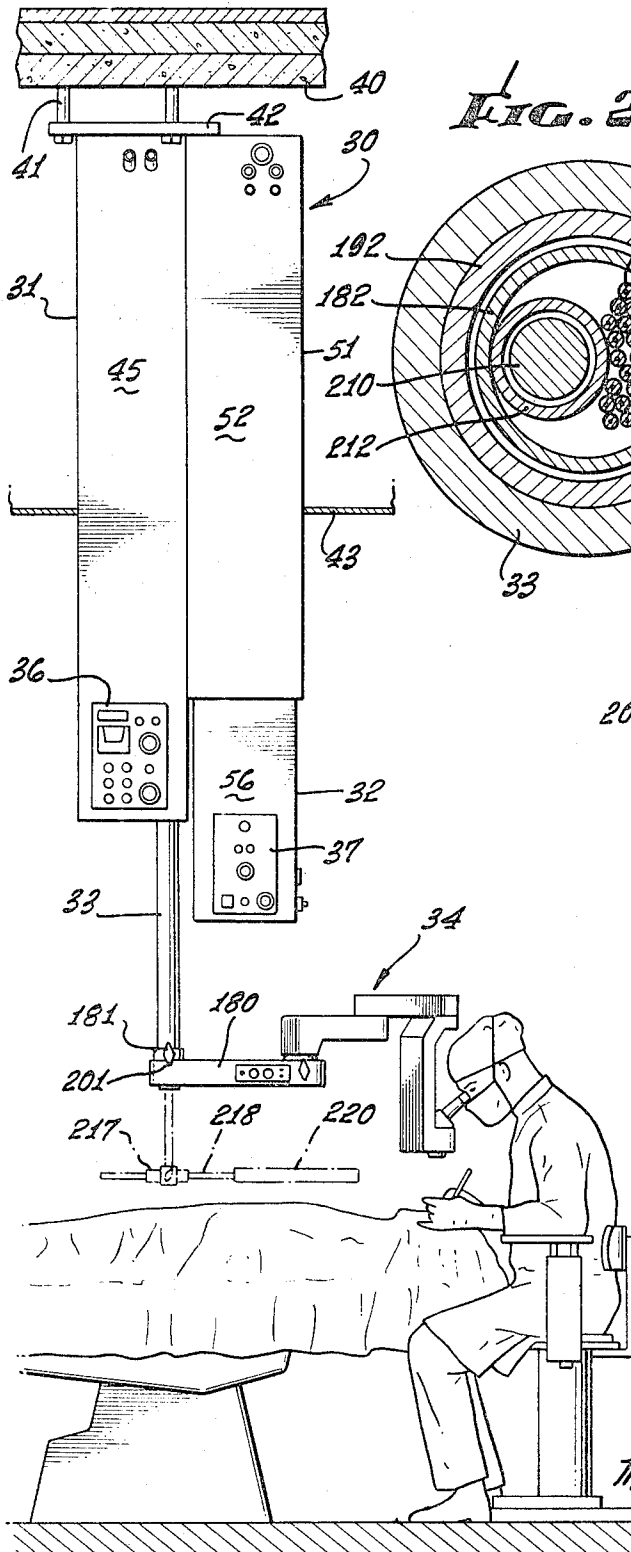


FIG. 22.

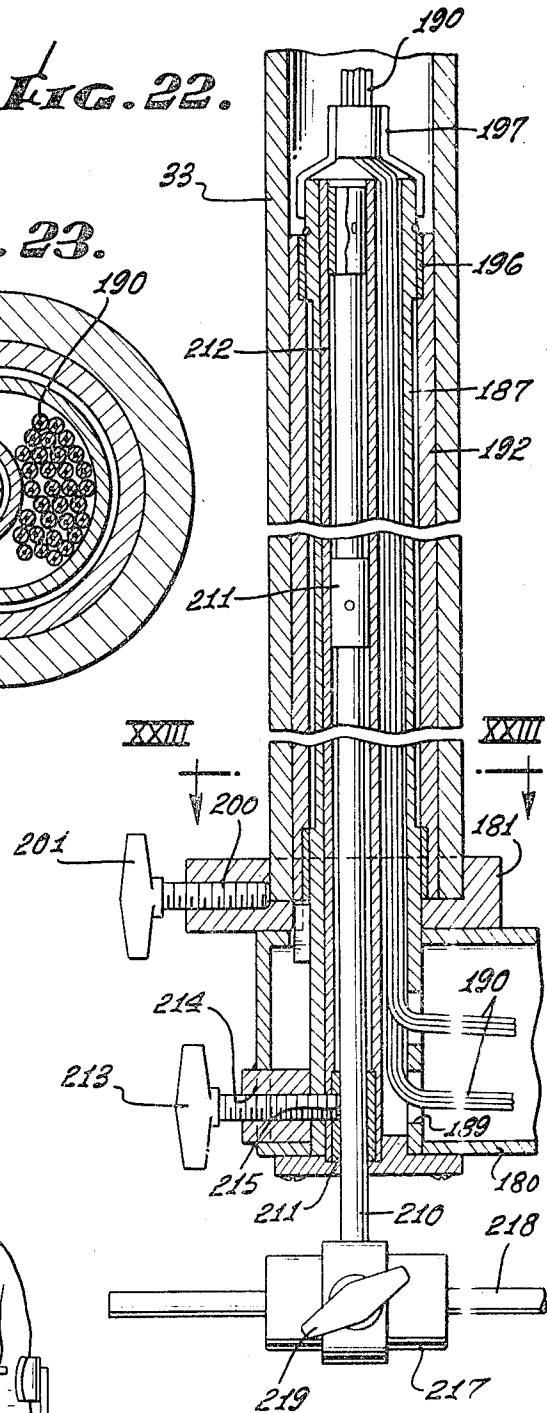
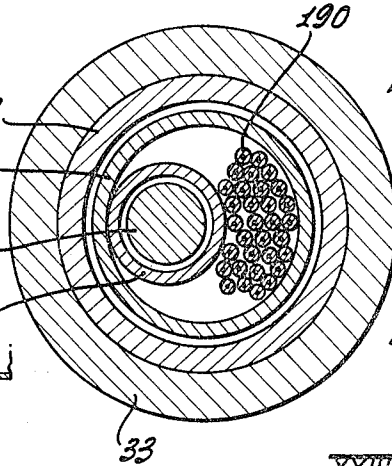


FIG. 23.



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FIG. 2.

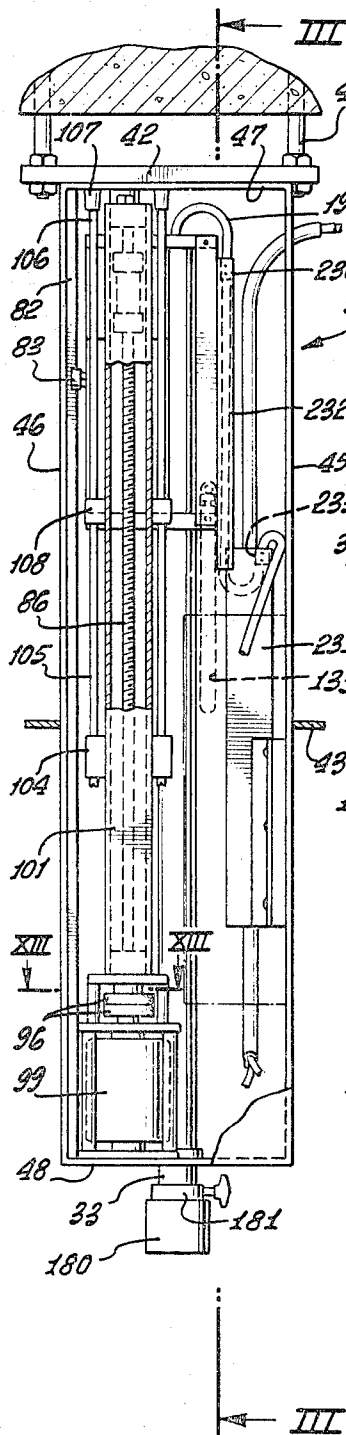


FIG. 3.

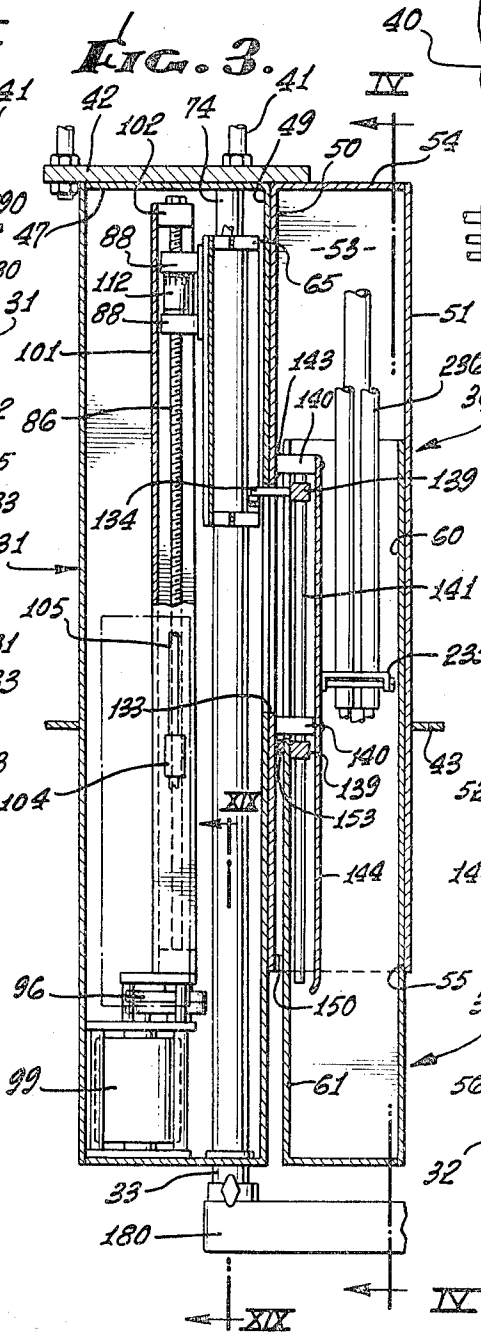
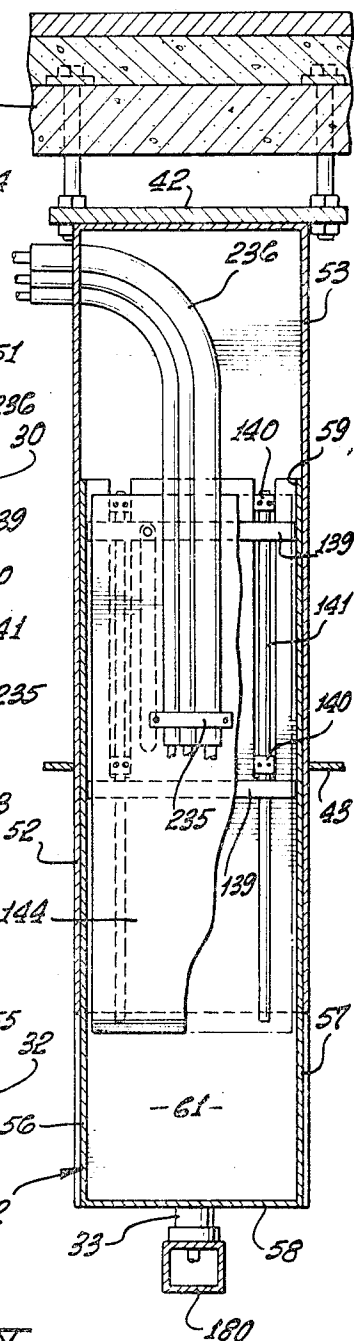


FIG. 4.



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FIG. 5.

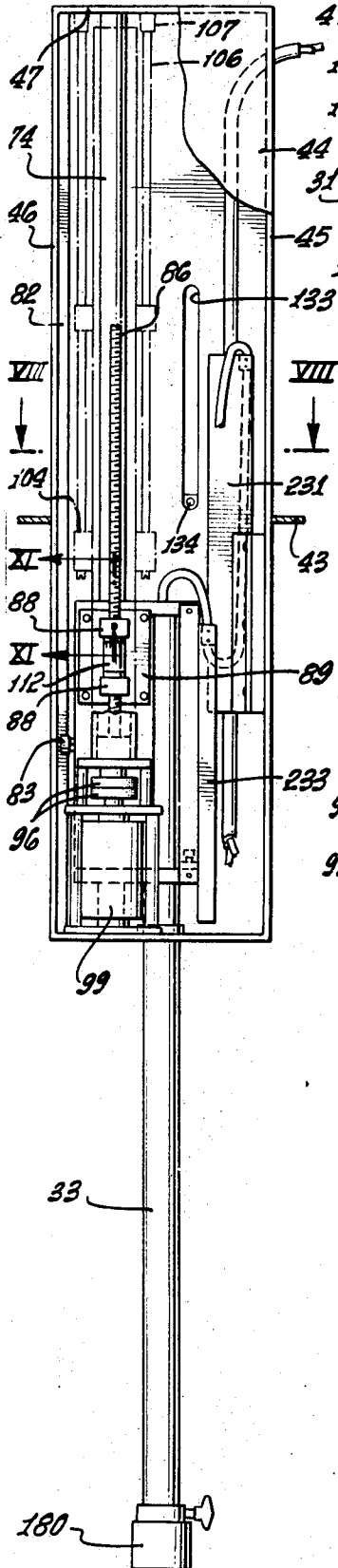


FIG. 6.

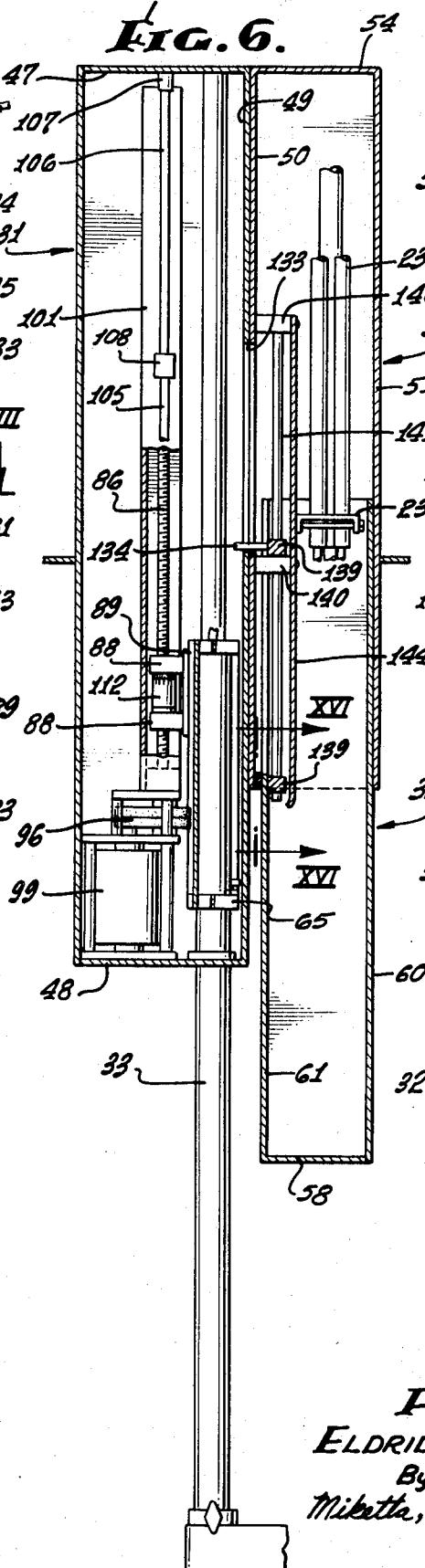
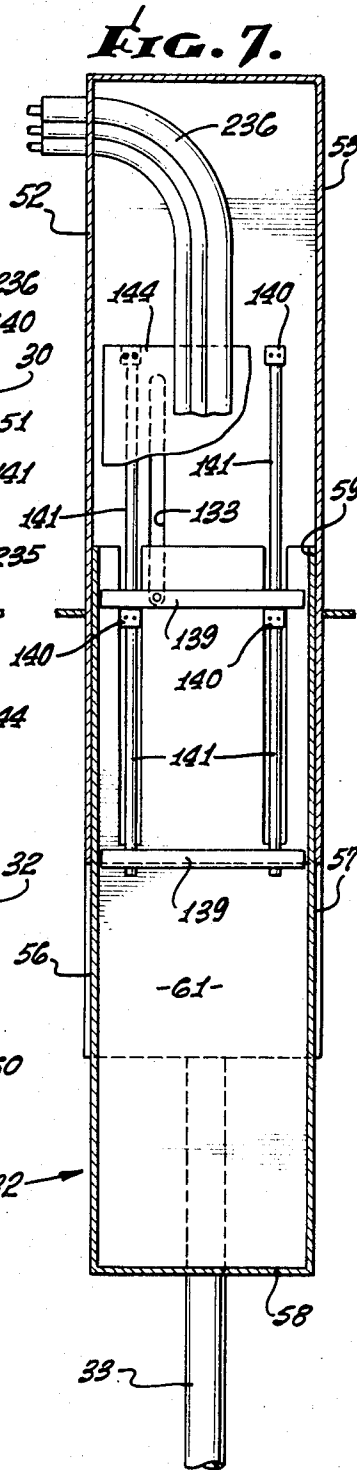


FIG. 7.



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FIG. 8.

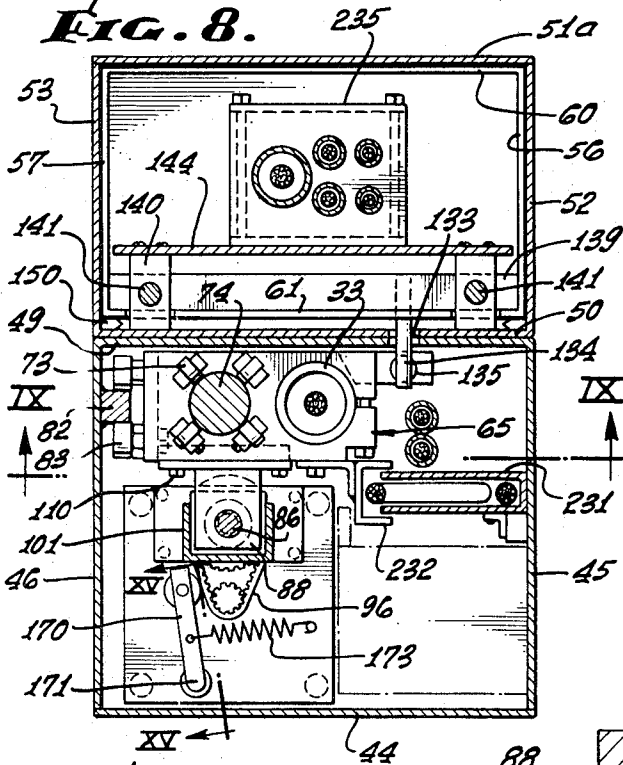


FIG. 9.

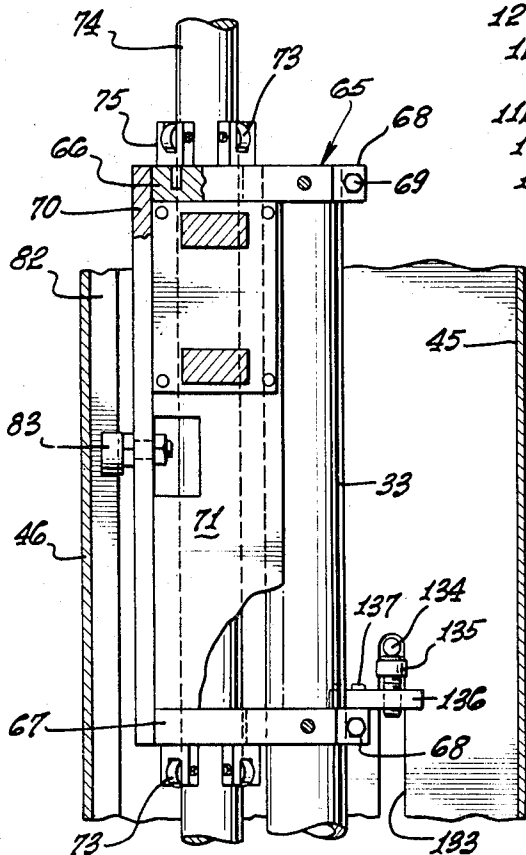


FIG. 10.

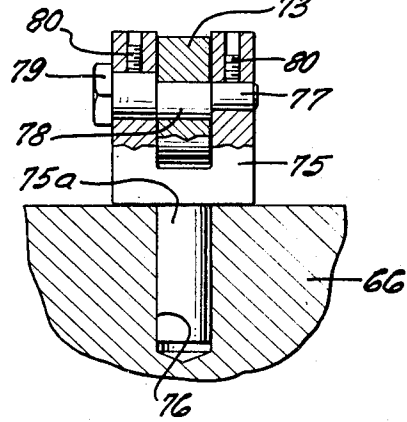
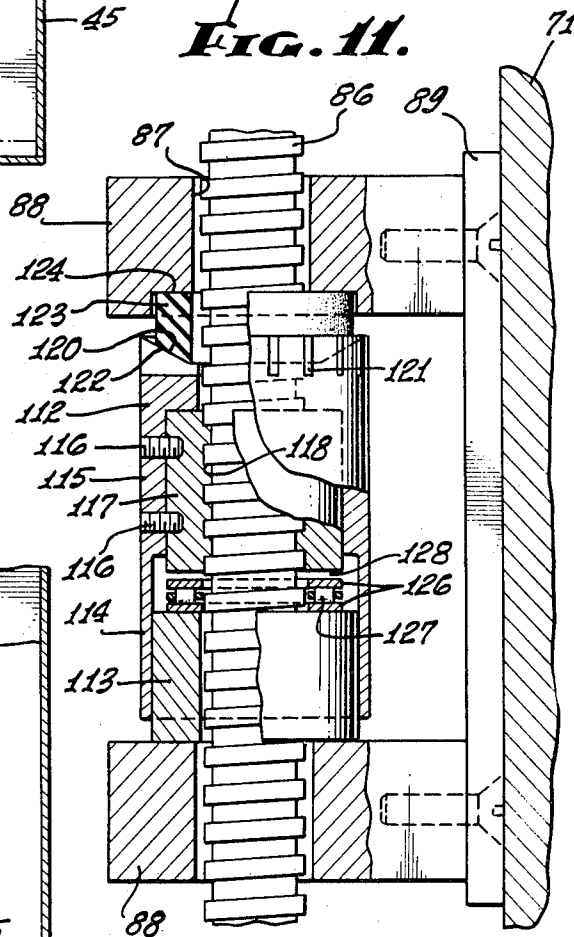


FIG. 11.



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FIG. 12.

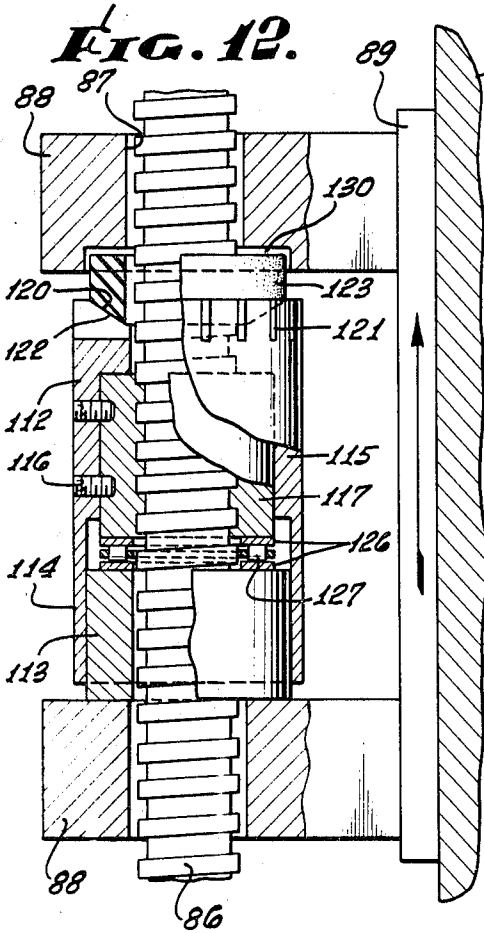


FIG. 14.

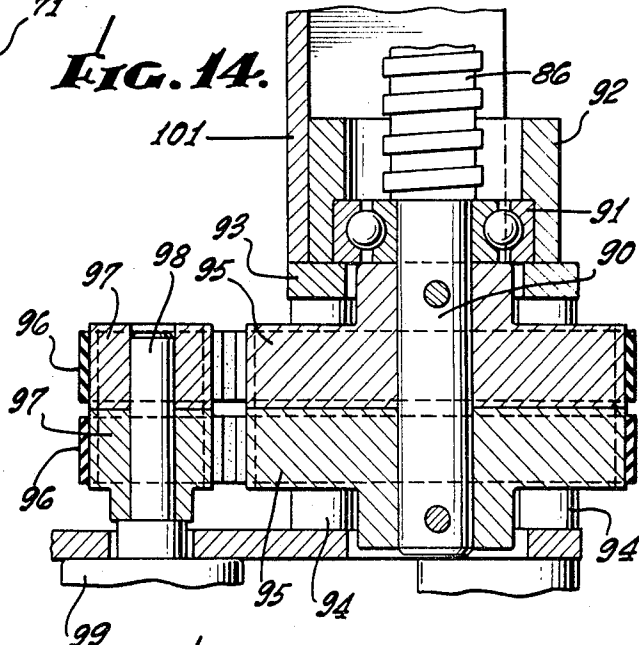


FIG. 15.

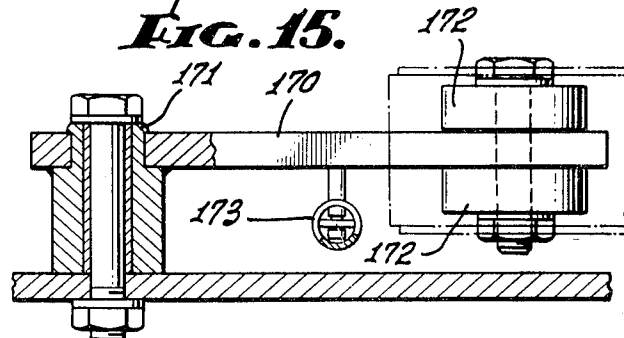
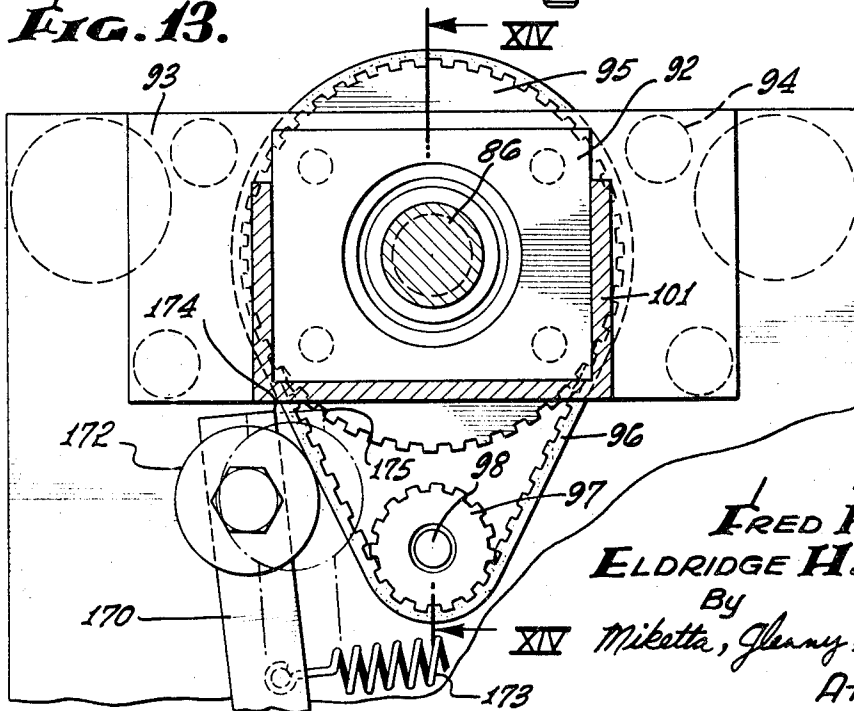


FIG. 13.



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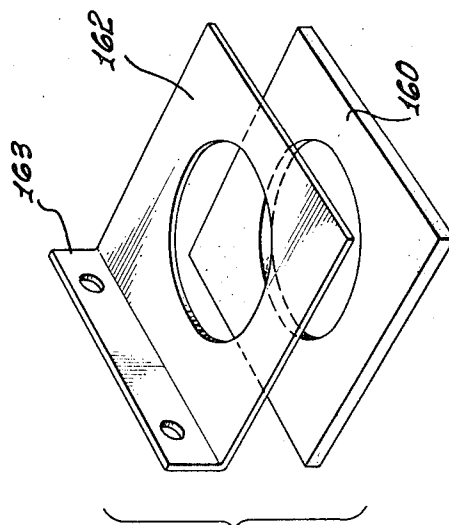
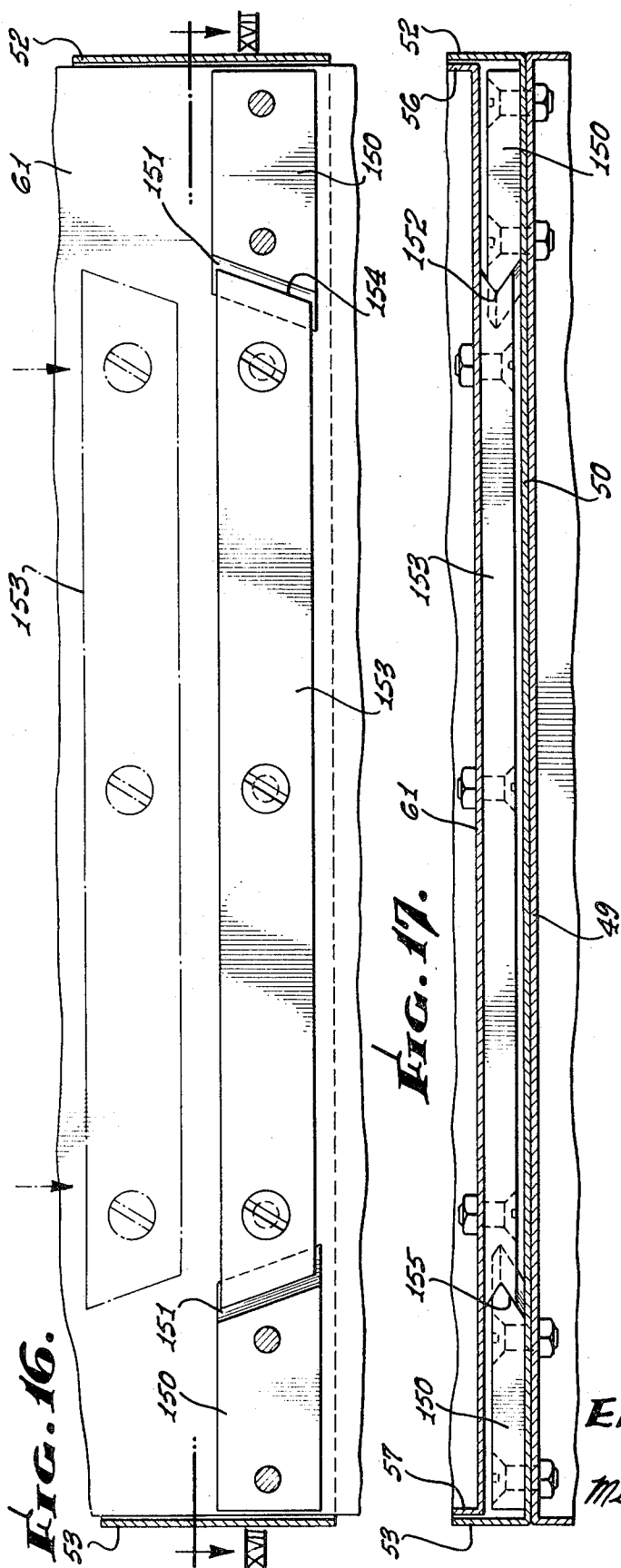


FIG. 18.

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FIG. 19.

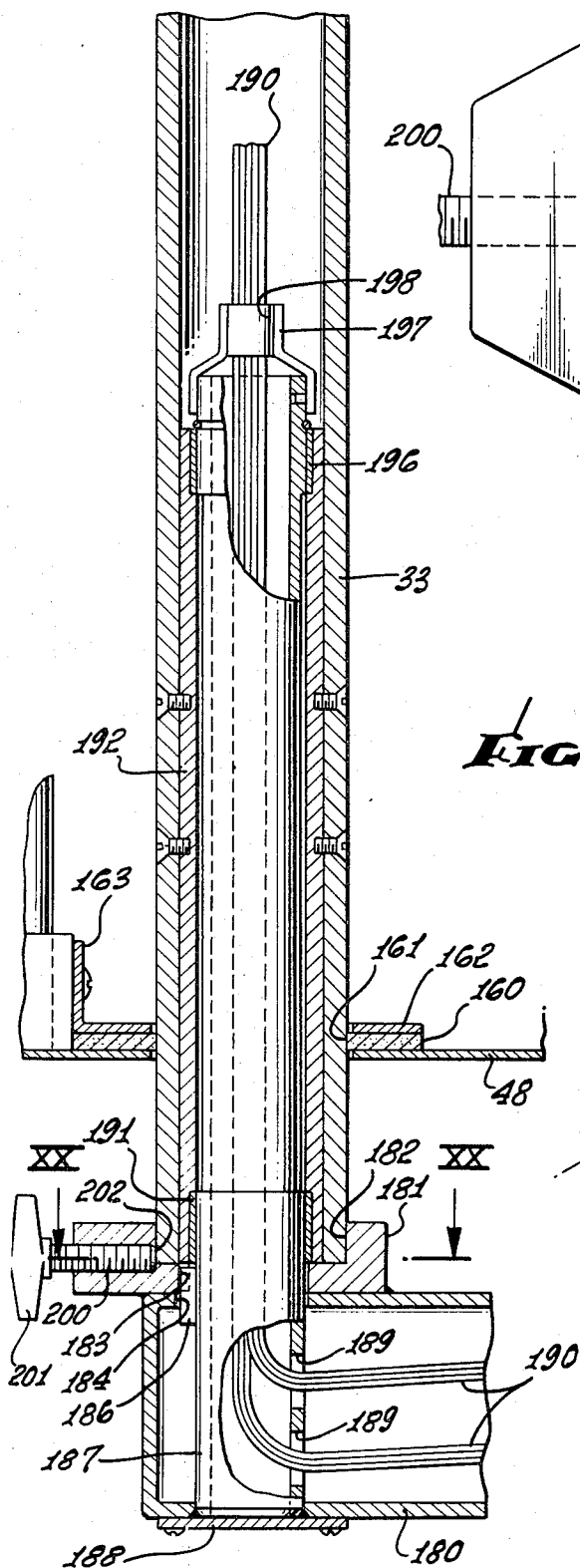


FIG. 20.

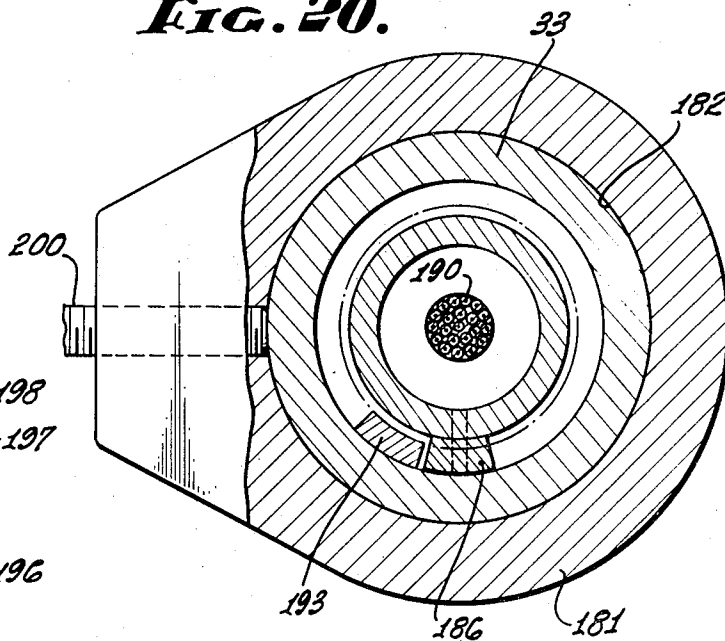
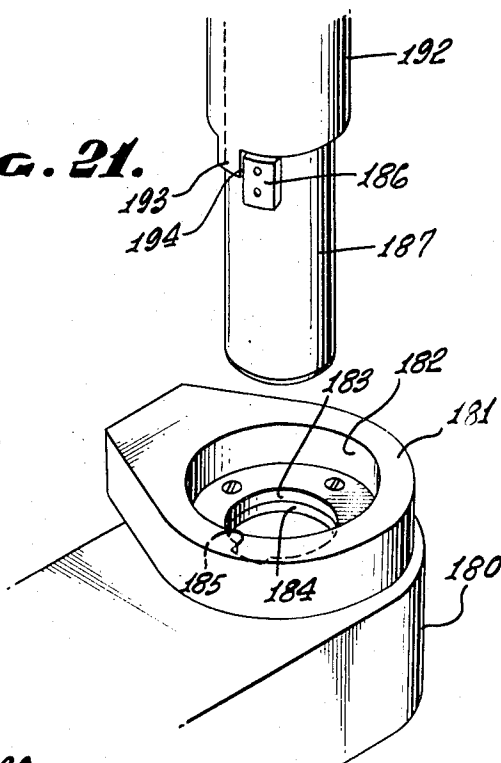


FIG. 21.



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OVERHEAD EQUIPMENT CONTROL APPARATUS FOR OPERATING ROOMS

BACKGROUND OF THE INVENTION

In hospital operating rooms numerous types of equipment and instruments are used in connection with operating on a patient. Normally such equipment is located adjacent to the operating table and such tables, trays and the like are often in the way of and obstruct free movement of doctors, nurses and other participants during an operation. In prior proposed arrangements of operating rooms such operating room equipment either required the presence of a person adjacent the surgical table or required the movement of an assistant to an adjacent wall to actuate the equipment through a remote control panel. It is desirable to provide for control equipment which is normally out of the way of doctors and assistants surrounding an operating table so that their free movement is not interfered with and at the same time provide convenient accessible readily operated control panels adapted to actuate various types of equipment for precise positioning in desired relationship with respect to a patient.

Some prior proposed equipment control apparatus have included a housing supported from a ceiling structure and positioned in overhead spaced relation to a surgical table. Such prior proposed constructions have included fluid or hydraulic lines associated with the equipment for raising and lowering a control or column member which supports the instrument arm arrangement. Such fluid actuated control equipment required considerable redesign and modification of a surgical room and fluid actuated equipment was preferably planned for and installed during construction of a surgical room because of size and weight of equipment involved.

The present invention contemplates a novel overhead equipment control apparatus which may be readily installed in a new operating room construction as well as old constructions. Thus, this overhead equipment may be installed, arranged and operated in existing surgical rooms without substantial reconstruction or modification of the operating room. The present invention contemplates, as an example, a novel construction which affords rapid raising and lowering of a control column which may support a microscope, camera, operating lights, strobe light and the like. The control means provided in the housing arrangement permits actuation of the equipment with respect to selectively positioning thereof by means of easily reached control panels having well known switch means. A stationary control housing contemplated by the present invention may be equipped with a power supply unit, switches for raising and lowering the column at a rapid or slow rate, intensity control for light sources, main power switches, and receptacles for remote control of a camera, foot or hand switch. An auxiliary or service housing may include electrical receptacles for connection to a television camera and other equipment requiring electrical power as well as switches for the various light sources employed in an operating room. The control member which is adapted to be raised and lowered with respect to the stationary housing may include switch means for fine focusing of a microscope carried at the end of the instrument support arm and receptacles for strobe light movie or still cameras and a microscope light.

It is therefore a primary object of the present invention to provide an overhead equipment control apparatus for use in an operating room which is adapted to supply a variety of power actuated instrument control means in a convenient manner to operating personnel and without obstructing or interfering with access to a surgical table and a patient thereon.

An object of the present invention is to disclose and provide an overhead equipment control apparatus wherein a support column or control means is readily vertically positioned with respect to a surgical table.

Another object of the invention is to disclose and provide an overhead equipment control apparatus for an operating room wherein a vertically movable control member is power driven by a novel driving means and wherein safety means is incor-

porated in the driving means so that downward movement of the control means will be stopped under preselected conditions.

A further object of the invention is to disclose and provide equipment for use in an operating room wherein power drive means for such equipment is provided with a safety lock means operable upon failure of certain components of the driving system.

A still further object of the present invention is to disclose and provide an overhead equipment control apparatus adapted to carry multiple electrical or power control lines in such a manner that such lines are enclosed and maintained against damage resulting from movement of certain parts of the equipment.

A specific object of the invention is to disclose and provide overhead control apparatus which encloses and furnishes built-in power services and switching in such a manner that control receptacles and switches are positioned in an overhead area convenient to operating personnel and without the presence of a multitude of cables, outlets, and the like in an area normally occupied by operating personnel about a surgical table or in a remote generally inaccessible area.

The invention contemplates generally an overhead apparatus adapted to be readily supported from a mounting means attached to an overhead ceiling structure and wherein all power cables and electrical lines leading to receptacles for power actuation of equipment are contained within a housing, wherein electrical drive means for raising and lowering certain components of the control equipment may be readily removed as a unit for service and maintenance, and wherein vertical adjustment of components of the equipment may be readily electrically controlled.

Another object of the invention is to provide equipment control apparatus for an operating room wherein the location of the apparatus facilitates maintenance of a sterile condition in a zone around and above an operating table.

Other objects and advantages of the present invention will be readily apparent from the following description of the drawings in which an exemplary embodiment of the present invention is shown.

IN THE DRAWINGS

FIG. 1 is a side elevational view of an overhead apparatus embodying the present invention and showing its relationship to a surgical table and chair.

FIG. 2 is an enlarged elevational view taken from the left of FIG. 1 with the side panel wall removed and with the service housing retracted.

FIG. 3 is a sectional view taken in the vertical plane indicated by line III-III of FIG. 2.

FIG. 4 is a sectional view taken in the vertical plane indicated by the line IV-IV of FIG. 3.

FIG. 5 is a view similar to FIG. 2 showing the column member in down position.

FIG. 6 is a view taken in the plane similar to FIG. 3 and showing the column member and service housing in down position.

FIG. 7 is a sectional view similar to FIG. 4 showing the service housing and column member in down position.

FIG. 8 is an enlarged transverse sectional view taken in the horizontal plane indicated by line VIII-VIII of FIG. 5.

FIG. 9 is a fragmentary enlarged sectional view taken in the vertical plane indicated by line IX-IX of FIG. 8.

FIG. 10 is an enlarged detail view, partly in section, showing roller mounting means for a carriage on the column shaft.

FIG. 11 is an enlarged fragmentary sectional view taken in the vertical plane indicated by line XI-XI of FIG. 5 showing the feed screw means in driving engagement for raising and lowering the column member.

FIG. 12 is a fragmentary sectional view similar to FIG. 11 showing the feed screw means in safety release position to stop downward movement of the column member.

FIG. 13 is a fragmentary enlarged transverse sectional view taken in the plane indicated by line XIII-XIII of FIG. 2.

FIG. 14 is an enlarged fragmentary vertical sectional view taken in the plane indicated by line XIV-XIV of FIG. 13.

FIG. 15 is an enlarged fragmentary vertical sectional view taken in the plane indicated by line XV-XV of FIG. 8.

FIG. 16 is an enlarged vertical sectional view taken in the plane indicated by line XVI-XVI of FIG. 6.

FIG. 17 is a transverse horizontal sectional view taken in the plane indicated by line XVII-XVII of FIG. 16.

FIG. 18 is an enlarged exploded view of a dust seal between the column housing and member as seen in FIG. 19.

FIG. 19 is an enlarged vertical sectional view taken in the vertical plane indicated by line XIX-XIX of FIG. 3.

FIG. 20 is an enlarged transverse sectional view taken in the plane indicated by line XX-XX of FIG. 19.

FIG. 21 is an enlarged perspective view of the column member and arm connection shown in FIG. 19.

FIG. 22 is a vertical sectional view taken in a plane similar to FIG. 19 and showing a modified construction for use of instrument trays.

FIG. 23 is a transverse horizontal sectional view taken in the plane indicated by line XXIII-XXIII of FIG. 22.

In the drawings an overhead equipment control apparatus embodying this invention is generally indicated at 30 and may comprise a depending stationary hollow column or housing means 31, an auxiliary service module or housing means 32 movable relative to the stationary housing, a vertically reciprocally movable column or control member 33 supported from the stationary housing, and suitable pivotally interconnected horizontally extending instrument support means 34 for convenient and facile positioning of selected equipment or instruments with respect to a patient on a surgical table positioned beneath the apparatus and with respect to a surgical chair in which a doctor performing a surgical operation may be seated. As shown in FIG. 1 a control panel 36 on housing means 31 may include pushbutton pressure switches associated with a power supply carried by housing 31 and adapted to selectively actuate various equipment, for example, providing vertical adjustment of column member 33 at either rapid or slow speeds, rotating a microscope support arm, providing variable intensity illumination for the microscope lamp power supply, provision for operating and making necessary adjustments for a TV camera, a still camera, a strobe light, a microphone and other like equipment. The control panel 36 is connected to cables, some of which are fed through control member 33 and instrument support means 34 to the particular instrument being employed.

The auxiliary housing means 32 is associated with stationary housing means 31 in such a manner that when control member 33 is lowered, auxiliary housing 32 descends a selected distance to provide convenient access to control panel 37 carried thereon. The control panel 37 is connected with a power source (not shown) which may be carried by auxiliary housing means 31. Control panel 37 may provide suitable outlets and button-type control means for remotely located cautery, diathermy, power erisphake and cryosurgical equipment. It may also include control means for television cameras, microphones, intercommunication channels and remote control lights and outlets for other services. It will be understood that the particular controls and the selected power actuated equipment associated with the apparatus of this invention may vary and the associated power supply and control circuits are well known and do not form part of the present invention. Such controls may be operated by assistants or by the doctor, and in some instances, a control panel for certain instruments may be mounted on instrument support means 34.

The stationary or main housing 31 may be supported from an overhead support structure 40 such as a ceiling or ceiling beam by means of depending hanger bolts 41 carrying a housing mounting plate 42. In FIG. 1, apparatus 30 extends above a suitably supported drop ceiling 43.

In FIGS. 2-4 apparatus 30 is illustrated with auxiliary housing means 32 in retracted or up position. Housing means 31 may comprise a vertically extending elongated rectangular hollow housing having a front wall 45, back wall 46 and top and bottom walls 47 and 48, respectively. Sidewall 49 is adjacent to and may form with a sidewall 50 a common wall between a parallel stationary housing extension 51 of elongated vertical rectangular form shorter than housing 31 and having a front wall 52, a back wall 53 coplanar with back wall 46, a top wall 54 and a bottom opening 55 through which auxiliary housing means 32 extends. The left side of stationary housing means 31 may be open as best seen in FIG. 2 or may be furnished with a vertical cover plate 44 not shown in FIG. 2 but shown in FIG. 8.

Auxiliary housing means 32 may comprise a hollow, elongated, rectangular housing adapted to be vertically slidably guided within the housing extension 51. Auxiliary housing 32 may comprise a front wall 56 approximately coplanar with front wall 45, a back wall 57, a bottom wall 58 and a top opening 59. Sidewall 60 may move along wall 51a of housing extension 51 and the opposite sidewall 61 may be spaced from wall 50 of the housing extension for association therewith as hereafter described.

Within stationary housing means 31 is supported the column or control member 33 for adjustable vertical movement. Column member 33 may comprise a hollow cylindrical member having a length approximately the length of the stationary housing means 31. Column member 33 extends through a suitable port in bottom wall 48 of housing means 31.

Means for moving column member 33 to raise or lower the instrument support arm 34 may comprise a carriage means 65 (FIG. 9) comprising top and bottom walls 66 and 67, respectively, each being provided with identical clamp means 68 including bolts 69 for receiving column member 33 and for tight frictional clamping engagement therewith for fixedly connecting carriage 65 to the column member 33. Plates 66 and 67 are interconnected by vertical carriage plates 70 and 71. Each top and bottom plate 66 and 67 may carry a set of four angularly spaced (at 90°) rollers 73 for rolling engagement with a fixed cylindrical guide rod 74 extending between top and bottom walls 47 and 48 of stationary housing 31 and having an axis lying parallel to the axis of control member 33. Each roller 73 may be supported from a yoke 75 having a central pin 75a received and secured within a bore 76 provided in the associated plate 66 or 67. In at least two rollers of each set yoke 75 supports an eccentric pin 77 (FIG. 10), having an eccentric central portion 78 upon which roller 73 is carried whereby adjustment of the axis of roller 73 towards and away from the surface of the guide rod 74 may be readily adjusted by turning head 79 on pin 77. Set screws 80 provided in yoke arms of yoke 75 hold pin 77 in its desired adjusted relationship with respect to rod 74.

Means for preventing rotative movement of carriage 65 about guide rod 74 may comprise a rectangular section elongated guide track 82, opposite sides of which are engaged by rollers 83 carried by plate 70. One of rollers 83 may be provided with a similar eccentric bushing or pin adjustment as disclosed in FIG. 10 so as to precisely adjust the space between the axes of the pair of rollers 83 for desired rolling engagement with guide track 82.

Means for driving carriage means 65 so as to raise and lower control member 33 may comprise a threaded feed screw 86 (FIG. 11) extending a major portion of the length of the stationary housing 31 and having an axis parallel to guide rod 74 and column member 33. Feed screw 86 passes through spaced ports 87 provided in spaced parallel laterally projecting lugs 88 fixed to a mounting plate 89 carried by plate 71 of carriage means 65. The threaded portion of feed screw 86 terminates adjacent its bottom end portion 90 (FIG. 14) thereof which may be mounted in suitable bearing means 91 carried in a bearing block 92 supported on a thrust plate 93 supported on top of vertical posts 94. Feed screw end portion 90 carries a pair of gears 95 driven through a pair of internal toothed belts

96 by a pair of tandem arranged pinion gears 97 fixed to a shaft 98 of a suitable electric motor means 99. Supported on upper thrust plate 93 and positioned by bearing block 92 is an upwardly extending channel section cover member 101 which extends to just below top wall 47 of the stationary housing and supports a top bearing block 102 (FIG. 3) for carrying or mounting the top end of feed screw 86.

Secured to channel section cover member 101 and spaced from the bottom thereof may be a pair of fixed blocks 104 (FIG. 2) through which may extend long securement rods 105 for threaded engagement at their top ends at 106 with threaded anchor sockets 107 fixed to top wall 47 and to mounting plate 42. Intermediate the ends of support rods 105 may be guide blocks 108 secured to sidewalls of cover member 101 whereby upon first unfastening bolts 110 (FIG. 8) which secure mounting plate 89 to wall 71 and then releasing securement rods 105 together with the bolts upon which the motor 99 is secured to the bottom wall 48 of the housing, the entire feed screw, motor, and gear assembly may be removed from stationary housing 31 for necessary maintenance and service.

Rotation of the feed screw 86 will cause raising and lowering of carriage means 65 by a normally nonrotatable nut means 112 (FIGS. 11, 12) positioned between the laterally extending lugs 88 on carriage means 65. Nonrotatable nut means 112 comprises a ported boss or base member 113 received within the lower portion of a cylindrical skirt 114 provided on an upper nut cap 115 which may be fixed by set screws 116 to a threaded nut element 117 having threaded engagement as at 118 with feed screw 86. Cap 115 includes a downwardly and inwardly flared recessed top surface 120 interrupted by radially extending slots 121 and providing a seat for a tapered downwardly facing complementary surface 122 of an annular resilient thrust ring 123 having a top edge face normally in thrust pressure engagement at 124 against top lateral lug 88. Below nut element 117, the base member 113 carries an anti-friction assembly comprising a pair of spaced races 126 with suitably caged rollers 127 therebetween arranged with their axes extending along radii from the axis of feed screw 86. The bottom race 126 is carried on the top edge face of the base member 113. The top race 126 is normally spaced below the bottom edge face of nut element 117 as at 128.

In normal operation the weight of the carriage 65 and the column member 33 together with the instrument positioning arm 34 will cause the upper lug to bear in pressure engagement against resilient member 123 and to thus hold the cap 115 and its fixed nut element 117 in releasable nonrotatable relationship to the feed screw 86. As feed screw 86 is rotated nut element 117 will axially move along the feed screw 86 in the selected direction and cause similar movement of carriage 65 and column member 33.

It will be apparent that depending upon the resilient characteristics of the resilient member 123 in order to provide the necessary nonrotatable relationship between the cap 115 and the lug portion 88 that upon selected relief or release of such pressure engagement as by imposing an upwardly directed force against the lower end of the control member 33 that the lug 88 will move away from the resilient member 123 as shown in FIG. 12 at space 130. When space 130 is so provided by a suitable upwardly directed force the nonrotatable nut element 117 will travel downwardly relative to feed screw 86 for pressure engagement against the top race 126 of roller bearings 127 and the normally nonrotatable nut element 117 will be thus permitted to rotate freely with the feed screw 86. Relative axial movement of the carriage with respect to feed screw 86 is thus prevented and further downward movement of column 33 with its associated accessories is stopped. Thus, predetermined pressure forces acting against a patient's body or other means located beneath the apparatus will cause prevention of further downward movement and possible crushing or damage to the body.

Relative movement between the auxiliary housing 32 and stationary housing 31 is best described with reference to FIGS.

2—9 inclusive. It will be noted that wall 50 and its corresponding common wall 49 are provided with aligned vertically extending slots 133 which vertically slidably receive a horizontally extending pin 134 (FIG. 9) which has an end portion resting upon a vertically adjustable bolt 135 carried in threaded engagement on a laterally extending lug 136 secured to carriage means 65 as at 137. The opposite end of pin 134 is secured to a cross bar 139 (FIGS. 3, 4) fixed to the upper portion of wall 61 of the auxiliary housing 32. Spaced cross bars 139 slidably receive a pair of parallel spaced fixed vertical guide rods 141, the upper ends and a central portion of which may be supported by spacer blocks 140 (FIG. 3) secured to wall 50 as at 143. A protective plate 144 is supported by spacer blocks 140 spaced therebelow to maintain space between wall 61 and plate 144 free and clear of cables and other equipment lines.

It will be apparent from FIG. 3 that when column member 33 and carriage means 65 are in up position that auxiliary housing 32 is also in up position and that pin 134 is at the top of slot 133. As the column member 33 is lowered downwardly by means of feed screw 86, nonrotatable nut means 112, and carriage means 65, the auxiliary housing 32 will be guided downwardly, under gravitational forces, within the stationary housing extension 51 until carriage means 65 reaches a position at which the auxiliary housing and the stationary housing are in wedging interlocked relation as later described. Downward movement of auxiliary housing 32 is thus stopped and carriage means 65 and column member 33 may progress further downwardly as indicated in FIG. 6. Likewise when auxiliary housing 32 is in down position it will be raised to its up position by contact of adjustment bolt 135 with pin 134 near the bottom edge of slot 133 so as to lift the auxiliary housing 32 as the carriage progresses upwardly at the upper portion of its travel.

Means for stabilizing and preventing vibration of auxiliary housing 32 in its down position with a substantial portion thereof extending below the stationary housing extension 51 may comprise a pair of horizontally spaced cleats 150 secured along bottom edge of wall 50. The pair of spaced cleats 150 may be provided with opposed downwardly directed converging edge faces 151 of inverted V-configuration as indicated at 152 (FIG. 17). Wall 61 of auxiliary housing means 32 carries at a position just below the bottom of slot 133, a horizontally extending wedge member 153 provided with converging end faces 154 having V-section configuration as indicated at 155 complementary to V-section 152. When auxiliary housing 32 reaches its lowermost position, horizontal member 153 will be moved into wedge engagement with cleats 150 and will wedgingly interlock the auxiliary housing with the housing extension in tight nonvibrating stable relationship.

Means for providing a dust or dirt seal to permit relative vertical movement of control member 33 through the port in the bottom wall 48 of the stationary housing is generally illustrated in FIG. 18 and may comprise a ported pad 160 of suitable felt or synthetic resilient material seated on the top surface of bottom wall 48 and having sealing engagement at 161 with the outer surface of the cylindrical control member 33. A retainer plate 162 may be provided with an upstanding flange 163 adapted to be secured in suitable manner to a lower base member supporting guide rod 74.

Means for locking the carriage and control member driving means against movement in the event pulley belts 96 should become defective, inoperative or break, may comprise a lock arm 170 (FIG. 8) pivotally mounted at 171 from the frame of motor means 99 and biased by a coil spring 171a in the direction of belts 96. Lock arm 170 carries belt engaging rollers 172 on opposite sides thereof for engagement with top and bottom belts 96 between the pinion gear 97 and gear 95 (FIG. 13). Rollers 172 have biased pressure engagement against belts 96 and normally maintain said belts in desired tension and serve as idle rollers. In the event both belts 96 break or for some other reason loose their driving engagement with gears 95 the rollers 172 move inwardly toward gears 95

so that corner 174 of lock arm 170 will be urged into a tooth recess on each or one of gears 95 as indicated at 175 and thereby stop rotation of feed screw 86 and vertical movement of control member 33.

The apparatus of the present invention also includes means for housing various power and control cables employed within the apparatus 30 and within instrument support arm 34 so that the control cables will not become tangled nor become twisted and result in power or control failure. Means to limit rotation of instrument support arm 34 to slightly less than 360° is shown in FIGS. 19—21. In FIG. 19 arm portion 180 may carry an upwardly facing socket member 181 having a circular recess 182 receiving the bottom end of column 33. A port 183 in socket 181 is aligned with a port 184 in arm portion 180 and said ports are provided with keyways 185 which receive a key 186 carried by a tubular sleeve 187 coaxial with member 33 and welded to arm portion 180 and is provided with a removable plate 188. Cable openings 189 permit passage of instrument control lines 190 from arm portion 180 to control member 33. Tubular member 187 has a top end which extends into a bushing 191 carried by a fixed elongated sleeve insert 192 provided in the lower portion of control member 33. Insert 192 carries a downwardly projecting lug 193 arranged to abut the upper portion of key 186 as at 194. The upper portion of tubular member 187 is provided with a bushing 196 carried in insert sleeve 192. A cap 197 may partially close the top of sleeve 187 and is provided with an axial opening 198 for axial guiding of control lines 190. It will thus be apparent that arm portion 180 may be swung through approximately slightly less than 360° and that the cable control lines 190 are so guided and protected that undue twisting thereof will be avoided. A securement bolt 200 having a wing-type head 201 may be threaded in the socket member 181 for pressure engagement at 202 to hold the instrument arm 34 in selected position with respect to control member 33.

As best seen in FIG. 22, tubular sleeve 187 also may support therewithin in offset coaxial relation to control lines 190 a vertically extending support rod 210 carried in suitable guide sleeve bearings 211 for permitting facile manual raising and lowering of rod 210. A wing-type headed bolt 213 having threaded engagement with a fitting 214 carried by the arm portion 180 may extend through sleeve member 187 for pressure engagement at 215 against the rod 210.

The lower end of rod 210 may carry a suitable fitting 217 from which may horizontally extend a suitable tray support rod 218, said rod being longitudinally adjustable in fitting 217 and fixed by a wing-headed type securement bolt 219 similar to bolt 213. As shown in FIG. 1 a tray 220 supported at the end of rod 218 may be readily positioned above a patient and within convenient reach of a surgeon or his assistant.

Control lines 190 may extend upwardly through the column 33 to its top and may then be turned downwardly in stationary housing 31 and secured against one side of carriage means 65 by a suitable clip 230. Lines 190 may extend downwardly for a distance greater than the length of carriage means 65 and may be received within a pair of overlapping opposed channel sections 231 and 232 and secured by another clip 233 to the top portion of channel section 231. Thus during relative movement of carriage means 65 and housing 31 cable lines 190 will be retained within suitable protective channel section members which maintain the lines in untangled relation. Cables associated with the auxiliary housing 32 may be enclosed in conduit secured by a suitable ported bracket 235 carried on plate 144.

In use of the above described apparatus 30 it will be apparent that upon lowering of control member 33 by actuation of selected switches that as carriage means 65 moves the control member downwardly the relatively movable auxiliary or service housing 32 will also be caused to be lowered a preselected distance to effect the wedging interlock between the housings as above described. Such lowering of the service module housing 32 positions the several control panels carried thereby adjacent the bottom thereof within convenient reach

of operating personnel. At a desired height above the surgical table the control member 33 may be stopped and the instrument support arm means 34 may be laterally swung and positioned as desired by loosening and tightening of the several wing bolts at the several pivotally connected sections of the instrument support arm means. It will be understood that the control means may include switches for power actuation of the surgical table to raise and lower the surgical table to patient receiving position and then to other desired positions for examination and operation. Since the control member 33 may be positioned directly above a patient's body, the control apparatus includes safety means above described whereby downward movement of the control member 33 is arrested upon selected noninjurious pressure contact with a body or member therebeneath. The instrument support arm 34 may be particularly designed for support of a microscope which is adapted to be electrically powered so that it may be readily focused, positioned, light intensity varied, and various other adjustments may be conveniently and readily made either by the operating surgeon or by his assistant.

It will be understood that the embodiment of the invention described above may be modified and varied in construction and all such modifications and changes coming within the scope of the appended claims are embraced thereby.

We claim:

1. In an overhead equipment control system for use in surgical operating rooms, the combination of:

a stationary control housing adapted to be suspended from an overhead structure;

a vertically movable auxiliary housing alongside said stationary housing and adapted to support selected instrument control means;

a vertically movable column member carried within the stationary housing and adapted to support selected instruments;

means for moving said column member including fixed guide means on said stationary housing, a carriage movable along said guide means and connected with said column member;

means releaseably connecting said auxiliary housing with said carriage for selected relative movement of said auxiliary housing with respect to said stationary housing;

drive means for said carriage including a feed screw carried by said stationary housing;

a normally nonrotatable nut engaging said feed screw and connected with said carriage; and

motor means carried by the stationary housing for driving said feed screw.

2. A system as stated in claim 1 including means between said vertically movable auxiliary housing and said stationary housing for holding said auxiliary housing in one position thereof in nonvibratable relationship to said stationary housing.

3. A system as stated in claim 1 wherein said means connecting said auxiliary housing with said carriage for moving said housing for a selected distance includes vertical slot means in said stationary and auxiliary housings.

4. A system as stated in claim 1 wherein said drive means for said carriage includes drive belt means a gear means for said belt means; and a biased normally idle roll means bearing against said belt means and operable upon failure of said belt means to lockingly interengage with said gear means to stop downward movement of the carriage.

5. An overhead equipment control construction for use in operating facilities including:

a stationary control housing carried by an overhead structure;

a column member vertically movable in said housing and having the lower end portion adapted to support a plurality of surgical instruments and equipment;

an auxiliary control housing movable relative to the stationary control housing; and

means interconnecting said column member and said auxiliary housing for downward and upward movement of said auxiliary housing at selected vertical zones.

6. In an overhead equipment control system for use in surgical operating rooms, the combination of:

a stationary control housing adapted to be suspended from an overhead structure;

a vertically movable auxiliary housing associated with said stationary housing and adapted to support selected instrument control means;

a vertically movable column member carried within the stationary housing and adapted to support selected instruments;

means for moving said column member including:

fixed guide means on said stationary housing;

a carriage movable along said guide means and connected with said column member;

drive means for said carriage including a feed screw carried by said stationary housing;

a normally nonrotatable nut engaging said feed screw and connected with said carriage;

motor means carried by the stationary housing for driving said feed screw; and

means carried by said carriage and releaseably engageable with said normally nonrotatable nut in response to downward pressure engagement of said column member with an object whereby said nut is releasable from its normally nonrotatable condition for permitting said nut to freely rotate to prevent further downward movement of said carriage and said column member.

7. In a system as stated in claim 6 wherein said releasably engageable means includes:

a resilient thrust member carried at one end of said nonrotatable nut and normally seated against a portion of

said carriage; and

means at the opposite end of said nut, normally out of engagement therewith, and adapted to be engaged by said nut when thrust loading at said one end of the nut reaches a preselected minimum force.

8. A system as stated in claim 7 wherein said normally nonengageable means includes a bearing means supported on a portion of said carriage.

9. An overhead equipment control construction for presenting equipment and controls therefor at selected heights above a work or operating area, comprising in combination:

a stationary vertically disposed control housing adapted to be carried by and depending from an overhead structure;

an adjustable vertically movable column member supported within said housing and having its lower end portion extending below said stationary housing and adapted to support means for carrying a plurality of instruments and equipment;

said stationary control housing including a vertically disposed stationary housing extension;

an auxiliary control housing reciprocally movable within said housing extension and adapted to be positioned at or below the lower end of said stationary housing;

means interconnecting said auxiliary control housing with said column member for moving said auxiliary housing during movement of said column member; and

drive means within said stationary control housing for moving said column member.

10. In an equipment control construction as stated in claim 9 including means connected with said column member and with said drive means and responsive to axial pressure on said column member for rendering said drive means inoperable to continue to move said column member.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,556,455

Dated January 19, 1971

Inventor Fred K. Storm et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 3, line 63, before "lights" insert --of--
" 7, " 40, after "bearings 211" insert --within
sleeve member 187 and within an insert
tube 212--
" 8, " 61, after "drive belt means" insert a
comma --,--
" 9, " 3, after "housing" insert --and said
column member together--
" 9, " 3, after "at" insert --a--
" 9, " 3, delete "zones" and insert --zone and
permitting separated movement of said
column member in another vertical
zone--

Signed and sealed this 19th day of October 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patent