M. SCHMIDT.

OPERATING TABLE.

APPLICATION FILED SEPT. 14, 1915.

1,190,195.

Patented July 4, 1916.

5 SHEETS—SHEET 1.

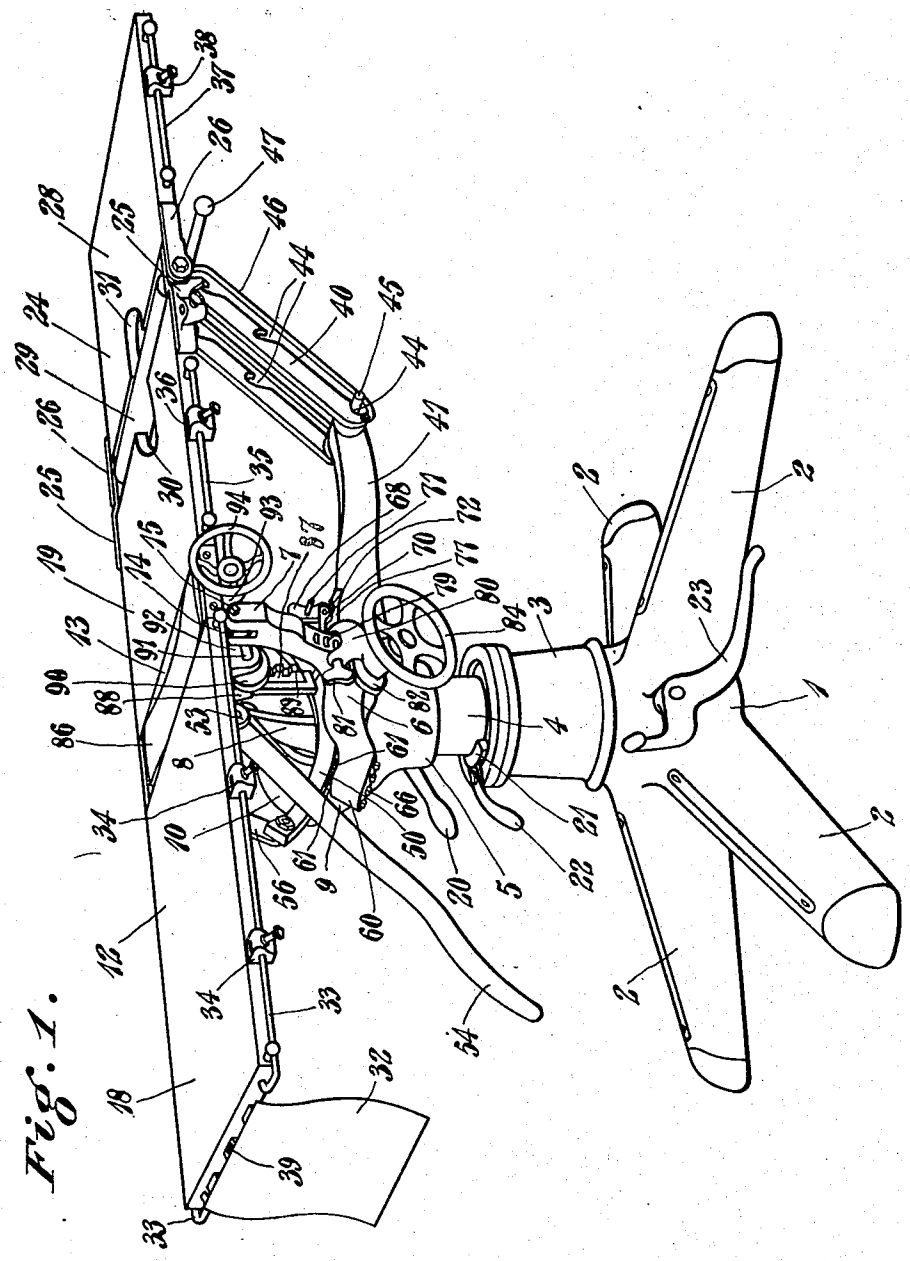


Fig. 1.

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OPERATING TABLE.

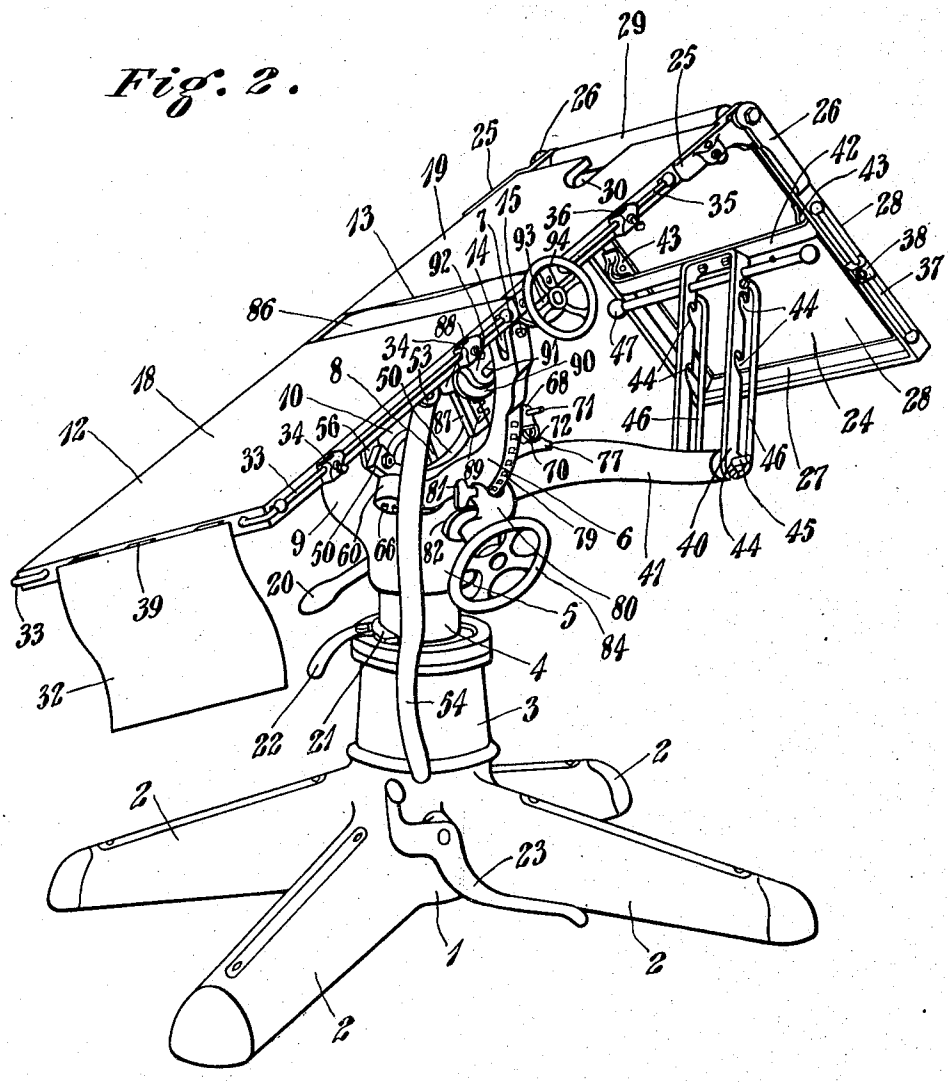
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5 SHEETS—SHEET 2.

Fig. 2.



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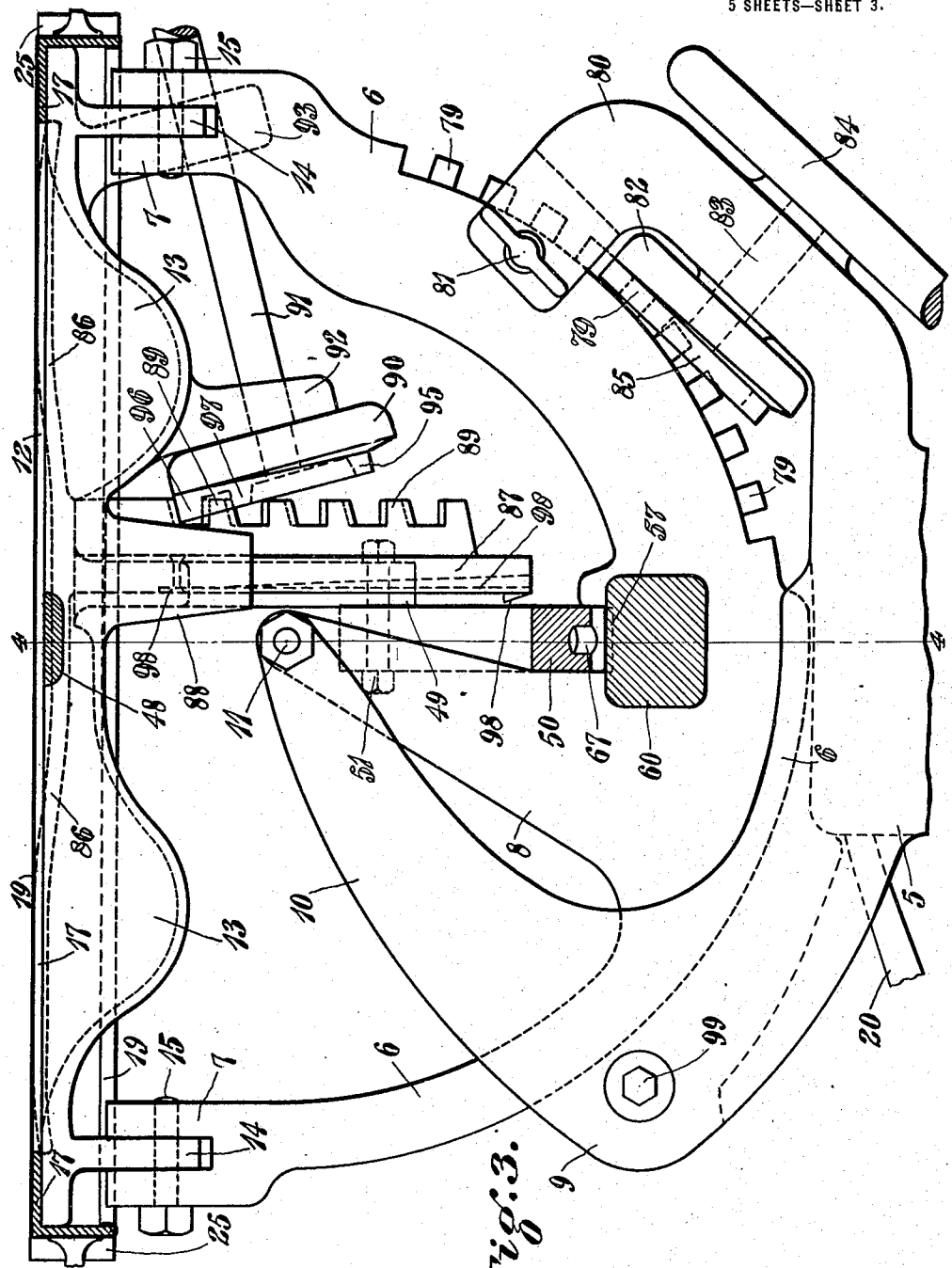


Fig. 3.

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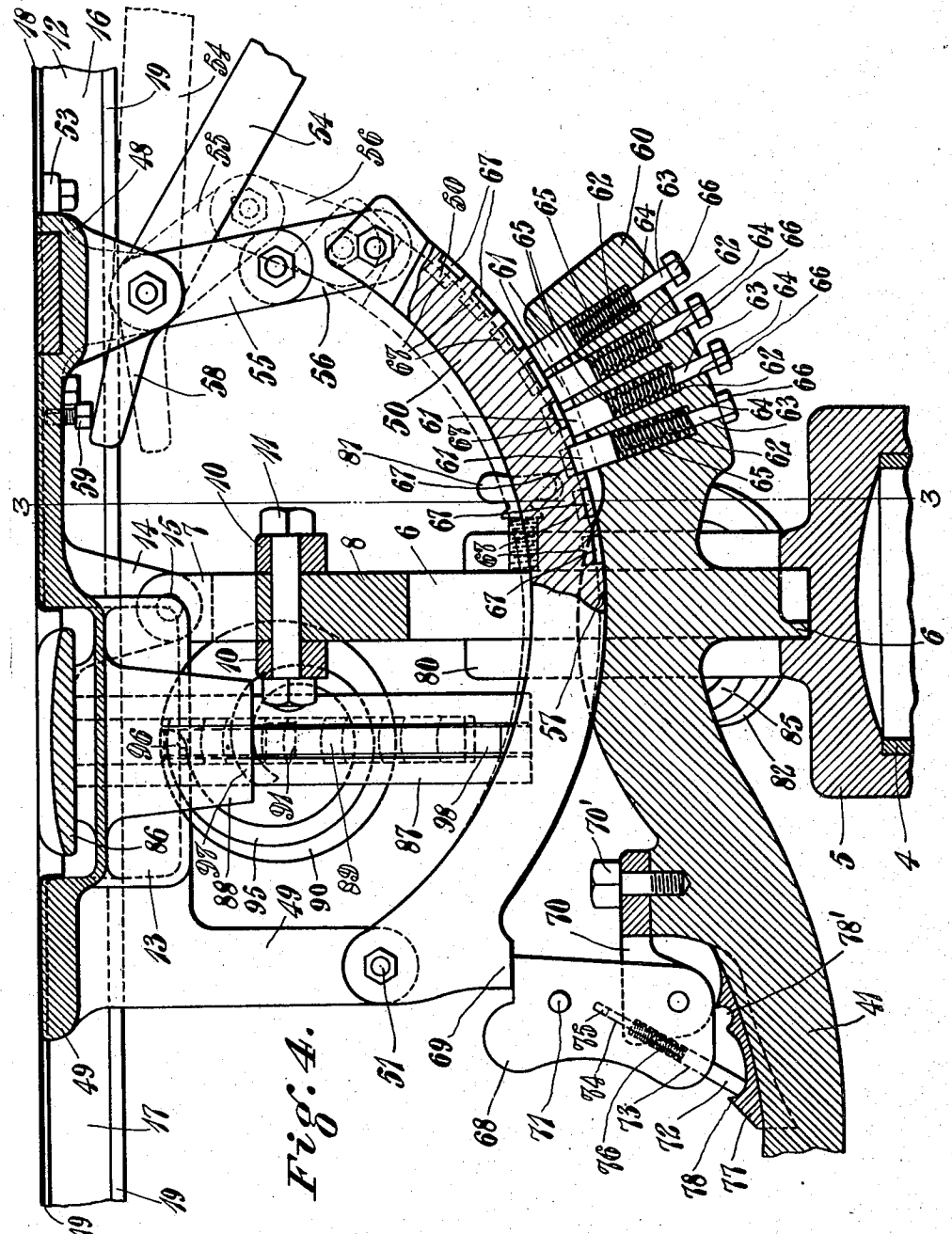


Fig. 4.

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5 SHEETS—SHEET 5.

Fig. 6.

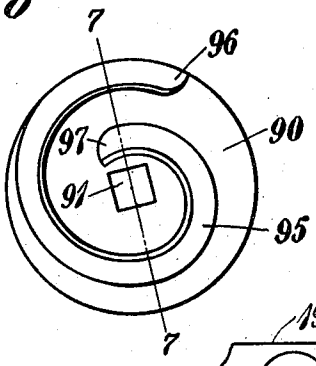


Fig. 7.

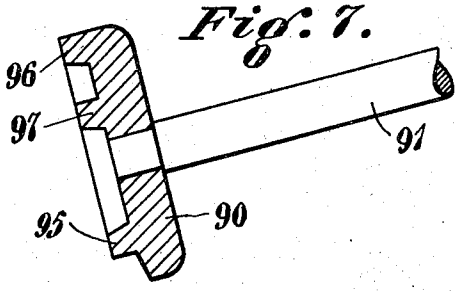


Fig. 5.

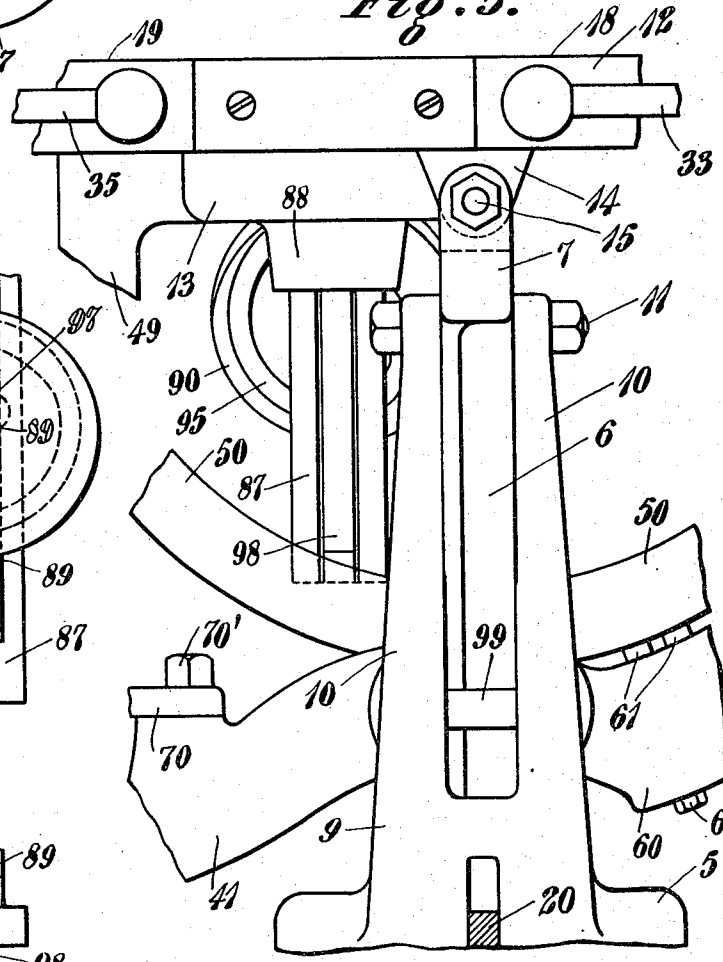


Fig. 8.

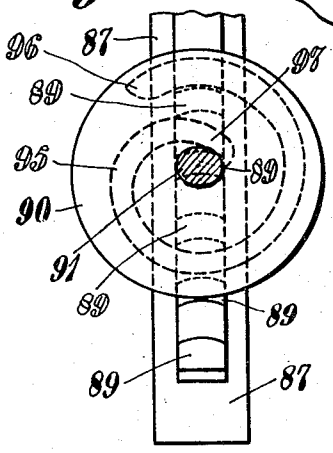
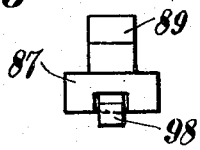


Fig. 9.



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OPERATING-TABLE.

1,190,195. Specification of Letters Patent. Patented July 4, 1916.

Application filed September 14, 1915. Serial No. 50,565.

To all whom it may concern:

Be it known that I, MAX SCHMIDT, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Operating-Tables, of which the following is a specification.

My invention relates to surgeons' operating tables; and its object is to provide a maximum of adjustment with ease and safety and to afford a maximum of firmness and strength in any of the various adjusted positions, without unduly adding to the complication of the mechanism.

My invention consists in the combination of parts and in the details of construction and arrangements of parts as will herein be more fully described and claimed.

In the drawings: Figure 1 is a general perspective front view of an operating table embodying my invention, the top and leg-extension being shown in their horizontal positions both laterally and longitudinally; Fig. 2 is a similar view but showing the top tilted longitudinally and laterally and with the leg-extension in the position that it assumes automatically upon such adjustment of the top; Fig. 3 is a vertical cross sectional elevation on the line 3—3 of Fig. 4; Fig. 4 is a vertical longitudinal sectional elevation on the line 4—4 of Fig. 3, looking from the rear side of the table, and the sector and its operating mechanism being represented in unclamped positions by dotted lines; Fig. 5 is a rear elevation of the middle upper part of the table; Fig. 6 is a detail rear elevation of the saddle-elevating cam wheel, showing its face; Fig. 7 is a section of the same on the line 7—7 of Fig. 6; Fig. 8 is a detail front elevation of the saddle-elevating cam wheel and part of the elevator rack; and Fig. 9 is a bottom end elevation of the rack.

As I prefer to construct my improved operating table, there is a base 1 with four legs 2 diverging from a central hollow column or cylinder 3 down into which fits a plunger 4 carrying on its upper end a body 5. A transverse segment 6 has its ends 7 presented upwardly and has a radially inwardly extending arm 8, while the body 5 has a rearward projection 9 with arms 10 that extend inwardly flanking the segment 6 with the inner end of the arm 8 of the segment pivoted to their inner end parts by means of a bolt 11. The top 12 comprises the oblong transverse nucleus 13 of trough formation, having lateral downwardly extending trunnions 14 received between bifurcations of the ends 7 of the segment 6 and pivoted on transverse screws 15 therein. Extending longitudinally from this nucleus 13 in both longitudinal directions are frames made up of angle bars 16 and 17 bent around to form the sides and ends of the top and rigidly secured to the nucleus 13 which may be a casting. Mounted on these frames and covering them are surface plates 18 and 19, preferably of thin sheet metal which has its edge parts bent down over the angle bars 16 and 17, respectively, and then up under the lower edges of the angle bars.

From the foregoing it will be seen that the top 12 is mounted for longitudinal tilting upon the direct supporting means or segment 6; and this latter is mounted for lateral tilting on the indirect supporting means, made up of the head 5 supported on the plunger 4 in the pedestal 1. This plunger 4 may be moved up and down in the central cylinder 3 of the pedestal 1 by any suitable means, that preferred being in the form of a pump which transfers oil from the interior of the plunger 4 into the cylinder 3 under the plunger, or vice versa, thus raising the plunger or allowing it to go down. Such an elevating and lowering means being well known, is not shown or described in detail. It is manipulated by means of the handle 20. This plunger 4 is also capable of turning in the cylinder 3 so that the top may be revolved, being held against either revolving or falling by means of a shoe 21 pushed against the side of the plunger 4 by means of an eccentric lever 22 pivoted on the upper end of the cylinder, (Figs. 1 and 2). The pedestal 1 is also provided with a suitable lever 23 for projecting rollers or casters downward from the legs 2 for rolling the table about or retracting these casters to allow the table to rest firmly upon the floor. This means not forming part of the present invention, is not further shown or described.

The end of the top 12 at the right has hinged to it the leg-extension 24 by means of suitable brackets 25 and 26 on the sides of the top and leg-extension, respectively. As best seen in Fig. 2 this leg-extension is made up of an angle bar 27 bent around to form its sides and end and covered with a

surface plate 28 after the manner of constructing the parts of the top 12. The adjacent ends of the top and leg-extension are separated some distance and a roller 29 is journaled transversely in the brackets 25 of the top; this roller being adapted to come under the knees of the patient in certain positions, thus acting as a fender from the sharp edges of the top and leg-extension as constructed of the angle bars and surface plates. These adjacent ends are also provided with recesses 30 and 31, respectively, to afford more convenient access during certain operations. The roller 29 may be made so it can be removed from its bearings during such operation.

The end of the top 12 at the left has the head rest 32 transversely hinged to it, and this head rest may be provided with any suitable means for holding it in various positions relative to the top. Running along the sides of this part of the top are rails 33 with socket members 34 slidable therealong and adapted to be clamped thereto at any point therealong. The other end part of the top 12 has rails 35 with socket members 36, and the leg-extension 24 has side rails 37 with socket member 38, mounted and adjusted in the same manner. Also there is a socket member 39 fixed to the left hand or head end in its middle. It will be understood that the purpose of these various socket members is to receive various attachments which, not being peculiar to my invention, need not be shown herein.

On the lower side of the leg-extension 24 is pivoted a brace 40, and extending to the right from the bottom part of the segment 6 and rigid thereon is the brace-arm 41 with which the brace 40 is adapted to be engaged in various positions. As best seen in Fig. 2, the brace 40 is made up of a flat bar bent into U-shape with the bottom of the U fixed to a transverse flat bar 42 having ends bent up and pivoted in brackets 43 on the lower sides of the angle bars 27. The lower edges of the U-shaped bar have opposite notches 44, and the brace-arm 41 has a transverse pin 45 projecting at both sides of the end part of the brace-arm with the sides of the brace 40 flanking the brace-arm and any two opposite notches 44 receiving the projecting parts of the pin 45. Retaining bars 46 extend from one end to the other of each base member under the notches 44. A handle rod 47 extends transversely through the brace 40 near its pivoted end and out to the sides of the top for manipulating the brace when making various adjustments of the leg-extension.

With the leg-extension thus braced against the segment or direct supporting means of the top, it will be seen that the leg-extension will be automatically adjusted relative to the top upon longitudinal tilting of the top on the segment or direct supporting means; and at the same time the top, leg-extension and segment in any of the adjusted positions just referred to may be tilted laterally with the segment, on the direct supporting means or pedestal.

The nucleus 13 has extending in opposite longitudinal directions, brackets 48 and 49, the latter extending downward. A clamp member in the form of a sector 50 lies longitudinally of the table in the middle of and above the bottom of the segment 6 and has one end pivoted by means of a bolt 51 to the lower end of the bracket 49. The other bracket 48 has a lug 52 projecting downward, and at the front side, in alinement with the lug 52, is a bearing 53. Across between this lug 52 and bearing 53 is pivoted a hand lever 54 and a toggle link 55 integral with each other. The toggle link 55 is connected to the adjacent end of the sector 50 by another toggle link 56. The hand lever 54 lies out at the side of the table as is best seen in Figs. 1 and 2, and when it is raised it breaks the toggle, raising the sector 50, as shown by the dotted lines in Fig. 4; but when it is depressed it straightens the toggle and the sector 50 is brought into clamping contact with a contact surface 57 which the upper inner side of the segment 6 has; this contact surface being substantially concentric with the pivot 15 of the top 12 on the segment. The lever 54 has a nose 58 projecting inward to engage with an adjustable stop 59 projecting down from the lower side of the bracket 48, so that the straightening of the toggle may be regulated.

From the above it will be seen that by means of this toggle clamping mechanism the top 12 may be held in any of its longitudinally tilted positions by the frictional engagement of the sector 50 with the segment 6. In order to increase the securitiy of this holding, I prefer to provide positive engaging means between the segment and sector. Thus, as is best seen in Fig. 4, the segment 6 has a projection 60 to the left under the sector 50 with plungers 61 mounted in bores 62 and having reduced stems 63 projecting down through and guided by counter bores 64 in the projection 60 and having helical springs 65 around these stems inside the bores 62 and nuts 66 on the lower ends of the stems to limit upward movement under action of the springs. The lower side of the sector 50 has a series of detents, being as here shown, formed by holes 67 bored in the sector. These plungers 61 and holes 67 are arranged in their respective parts in rows circumferentially of the circle of which the surface of the sector is substantially an arc. However, the spacings of the holes 67 and plungers 61 are different; the distance between each two plungers 61, as shown, be-

ing considerably less than the distance between each two holes 67. As here shown, the plungers 61 are four in number, while there are eight holes; and it will be understood that the number of both may be varied according to particular requirements.

By this means a far greater number of positive adjustments may be made than could be made with merely a single plunger to engage with any one of the detents; because although only one plunger may enter a hole at any adjustment, each one of these plungers may enter each one of the holes, and therefore the number of adjustments is equal to the number of plungers multiplied by the number of holes; for instance, the example shown giving thirty-two positive adjustments. The release of this positive locking means is accomplished by raising the sector by means of the lever 54 and those plungers 61 that do not enter holes 67 at any given adjustment are depressed by engagement of their upper ends with the surface of the sector.

While it is often necessary to depress the left hand or head end of the top below the horizontal position, as seen in Fig. 2, it is generally desirable to limit the tilting of the top in the other direction to the horizontal position. For this purpose a stop member 68 projects up from the brace-arm 41 and engages with a boss 69 on the lower side of the sector 50 near its end that is pivoted to the extension 49. However, to permit additional tilting of the top so as to bring the foot end below the horizontal position, this stop member 68 has its lower end pivotally mounted in a clip 70 which thus forms its connection to the brace-arm 41 by means of a bolt 70′. Thus the stop member 68 may be swung outward and downward and then the top may be tilted until its boss 69 engages with the head of the bolt 70′. A rod 71 extending transversely through the stop member 68 forms a handle therefor. To hold this stop member 68 in either one of its positions a plunger 72 slides in a bore 73 and has a stem 74 sliding in a counter bore 75 with a helical spring 76 around the stem inside the bore 73; thus projecting from the bottom of the stop member 68 and engaging with a detent piece 77 fixed on the top of the brace-arm 41 under the stop member 68, which detent piece 77 has two notches 78 and 78′ to receive the lower end of the plunger 72 and hold the stop member 68 in its operative and inoperative positions, respectively.

For tilting the direct supporting means or segment 6 laterally, and thus tilting the top 12 laterally, the front side of the segment 6 is provided with a series of radial teeth 79 and the body 5 has a forwardly and upwardly projecting fork 80 with parts flanking the segment 6 and a set screw 81 passing through one of the parts and engaging with the segment to hold the segment in any of its laterally tilted positions, the toothed part of the segment swinging through this fork. In the part of the fork 80 adjacent to the body 5 a cam wheel 82 has a short shaft 83 journaled, on the outer end of which is a hand wheel 84; the positions of these parts being such that the cam wheel 82 has its rear face presented up toward the toothed part of the segment 6. On this face is a raised convolution 85 to engage with the teeth 79 on the segment 6.

A saddle 86 normally lies transversely in the transverse trough formation of the nucleus 13 and has an elevator rack 87 projecting down from its bottom through a suitable bearing 88 in the nucleus near the middle. The teeth 89 of this rack 87 are presented forwardly of the table under the nucleus, and a cam wheel 90 is fixed on a shaft 91 that extends out to the side of the table in bearings 92 and 93 on the bottom of the nucleus and having a hand wheel 94 at the front side of the table. The face of this cam wheel 90 has the convolution 95 engaging with the teeth 89 of the rack 87. This cam wheel 90 and the cam wheel 82 above mentioned are substantially alike, and the illustrations of the cam wheel 90 in Figs. 6 and 7 will be understood to apply substantially to the cam wheel 82 also; while the showing of the manner of coöperation of the cam wheel 90 with the rack 87 in Fig. 8 will indicate substantially the relation of the cam wheel 82 to the segment 6. It will be seen that as either the end 96 or end 97 of the convolution enters between two teeth, the other end is about to leave the space between one of the teeth and the other adjacent tooth. In order that the parts of the convolution diametrically opposite from the meshing parts may clear the teeth 89, the cam wheel 90 and its shaft 91 are inclined as shown, and the contacting sides of the teeth and convolution are beveled in accordance with the inclination. For the same reason the cam wheel 82 is made substantially tangent to the segment with the point of tangency substantially that of the meshing point.

It will be understood that these cam wheels will hold the parts that they adjust rather firmly; and the saddle, therefore, is not, as here shown, provided with any other holding means. The elevator rack, however, is provided with a resilient stop 98 near its lower end which yields to allow insertion of the rack 87 down through its bearing 88, but there projects backward to engage with the bottom of the bearing 88 and prevents raising the saddle 86 too far to be properly supported by the bearing 88 and cam wheel 90.

The set screw 81 before alluded to is provided to reinforce the cam wheel 82 in holding the top in its laterally tilted positions.

The backward projection 9 of the head 5

has a stud bolt 99 between its arms 10 outside the segment 6 to strengthen this part of the indirect supporting means.

By mounting the top on a single central pedestal, and thus eliminating all side frames and corner legs from the supporting means, the obstructon to the operator is considerably reduced; and by locating all of the manipulating means at the front side of the table, where they are readily accessible, the convenience of adjustment is greatly increased. Also, by providing the cam wheels for elevating and lowering the saddle and for lateral tilting of the top, these adjustments may be made quickly and yet securely; because these cam wheels are more rapid in their action than screws or worms and worm wheels, while at the same time they are not turned under the weight imposed on the adjusted part, even without the use of such fastening means as the set screw 81, which is provided merely to afford double security of the lateral tilting adjustment of the top. This lateral tilting of the top, in itself, greatly adds to the usefulness of the operating table; and the combination with this of the elevating and lowering and revolving provisions along with the provision for longitudinal tilting affords about every adjustment that will be needed in an operating table.

The pedestal and parts associated therewith are made heavy and substantial; while the top, which must be moved up and down and titlted by the operator, is made extremely light yet amply strong by the combination of the frames and the thin surface plates. This also allows the surface plates to be made of metal well adapted to resist corrosion, such as an alloy containing a high percentage of nickel.

While I have shown and described specifically the preferred construction of my operating table, what I claim as new and desire to secure by Letters Patent is:

1. In an operating table, a top, a segment with a hinged connection to the top for tilting the top in one direction, a radially inwardly extending arm on said segment, and a pedestal to which said arm on the segment is pivoted for supporting the segment and top for tilting in another direction.

2. In an operating table, a top, lateral trunnions on said top, a transverse segment with ends hingedly connected to said trunnions, supporting the top for longitudinal tilting, a radially inwardly extending arm on said segment, secondary supporting means to which said arm on the segment is pivoted for supporting the segment and top for lateral tilting, a leg-extension hinged to one end of said top, a brace-arm on said segment, and a brace pivoted on said leg-extension and adjustably engaging with said brace-arm, causing automatic adjustment of said leg-extension relative to the top upon longitudinal tilting of the top.

3. In an operating table, a top, supporting means with a hinged connection to the top for tilting the top, a clamp member having one end pivoted on said top at one side of said hinged connection, said supporting means having a contact surface substantially concentric with said hinged connection, a toggle connection from said top to the other end of said clamp member at the other side of said hinged connection, and means for operating said toggle connection to clamp said clamp member against said contact surface to hold said top on said direct supporting means in different tilted positions.

4. In an operating table, a top, a segment with a hinged connection to said top, supporting the top for tilting, a sector having one end pivoted on said top at one side of said hinged connection, said segment having a contact surface substantially concentric with said hinged connection, a toggle connection from said top to the other end of said sector at the other side of said hinged connection, and means for operating said toggle connection to clamp said sector against said contact surface to hold said top on said segment in different tilted positions.

5. In an operating table, lateral trunnions on said top, a transverse segment with ends hingedly connected to said trunnions, supporting the top for longitudinal tilting, a sector having one end pivoted on said top longitudinally away from said trunnions in one direction, said segment having a contact surface substantially concentric with said trunnions, a toggle connection from said top to the other end of said sector longitudinally away from said trunnions in opposite direction, and means for operating said toggle connection to clamp said sector against said contact surface and hold said top on said segment in different longitudinally tilted positions.

6. In an operating table, a top, lateral trunnions on said top, a transverse segment with ends hingedly connected to said trunnions for longitudinal tilting of the top, a laterally displaced radially inwardly extending arm on said segment, a pedestal, a laterally displaced arm on said pedestal extending radially inwardly of said segment to which arm said arm on the segment is pivoted for supporting the segment and top for lateral tilting, a sector having one end pivoted near the middle of said top longitudinally away from said trunnions in one direction, said segment having a contact surface near its middle and substantially concentric with said trunnions, a toggle connection from near the middle of said top to the other end of said sector longitudinally away from said trunnions in opposite direction, and a lever

at one side of said top for operating said toggle connection to clamp said sector against said contact surface to hold said top on said segment in different longitudinally tilted positions.

7. In an operating table, a top, supporting means with a hinged connection to the top for tilting said top, and a stop for said top on said supporting means, said stop being mounted for movement out of operative position to allow additional tilting of the top.

8. In an operating table, a top, supporting means with a hinged connection to the top for tilting said top, locking means on said supporting means at one side of said hinged connection to lock said top in the different tilted positions, and a stop on said supporting means at the other side of said hinged connection, said stop being mounted for movement out of operative position to allow additional tilting of the top.

9. In an operating table, a top, supporting means with a hinged connection to the top for tilting said top, locking means on said supporting means to lock said top in the different tilted positions, comprising a part on said supporting means and a part swinging with said top, one of said parts having circumferentially spaced - apart detents thereon, and plungers in the other part to engage with said detents, but spaced apart circumferentially a distance different from that of the spacing of said detents.

10. In an operating table, a top, supporting means with a hinged connection to the top for tilting said top, and locking means on said supporting means to lock said top in the different tilted positions, comprising a part on said supporting means and a part swinging with said top, said part swinging with the top having circumferentially spaced-apart detents therein, and plungers in the part on said supporting means to engage with said detents, but spaced apart circumferentially a distance different from that of the spacing of said detents.

11. In an operating table, a top, lateral trunnions on said top, a transverse segment with ends hingedly connected to said trunnions for longitudinal tilting of the top, secondary supporting means to which said segment is pivoted for lateral tilting, a sector having one end pivoted on said top longitudinally away from said trunnions in one direction, said segment having a contact surface substantially concentric with said trunnions, a toggle connection from said top to the other end of said sector longitudinally away from said trunnions in opposite direction, a lever at one side of said top for operating said toggle connection to clamp said sector against such contact surface to frictionally hold said top on said segment in different longitudinally tilted positions, locking means on said segment longitudinally away from said trunnions in one direction to lock said top in the different longitudinally tilted positions, and a stop to engage with said sector, on said segment longitudinally away from said trunnions in the other direction, said stop being mounted for movement out of position for engagement with said sector to allow additional tilting of the top.

12. In an operating table, a top comprising a nucleus lying transversely of the top, and supporting means having hinged connection with this nucleus, on which the top is tiltable longitudinally, and having a contact surface substantially concentric with said hinged connection, a bracket on this nucleus extending longitudinally of and under the top, and toggle-operated clamping means connected to this bracket to clamp against said contact surface and hold said top on said supporting means in different longitudinally tilted positions.

13. In an operating table, a top comprising a nucleus lying transversely of the top, and supporting means having hinged connection with this nucleus, on which the top is tiltable longitudinally, and having a contact surface substantially concentric with said hinged connection, brackets on this nucleus extending longitudinally of and under the top in opposite directions, a sector having one end pivoted on one of these brackets, operative connection between the other end of said sector and the other one of said brackets, and means for operating said operative connection to clamp said sector against said contact surface and hold said top on said supporting means in different longitudinally tilted positions.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."