J. C. LANDENBERGER.

FRACTURE TABLE.

APPLICATION FILED MAY 11, 1914.

**1,113,658.**

Patented Oct. 13, 1914.

4 SHEETS—SHEET 1.

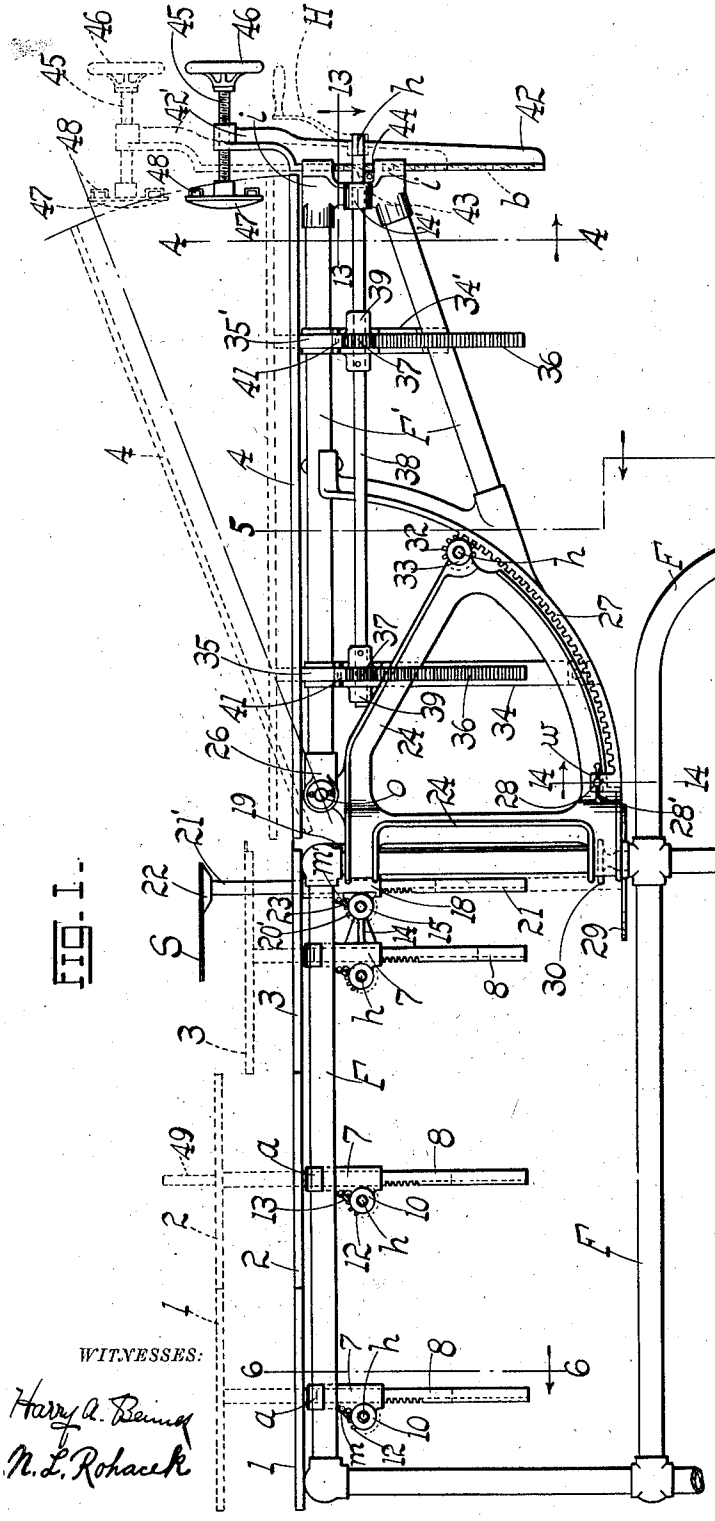


FIG. 1.

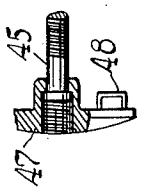


FIG. 15.

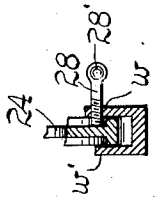


FIG. 14.

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4 SHEETS—SHEET 2.

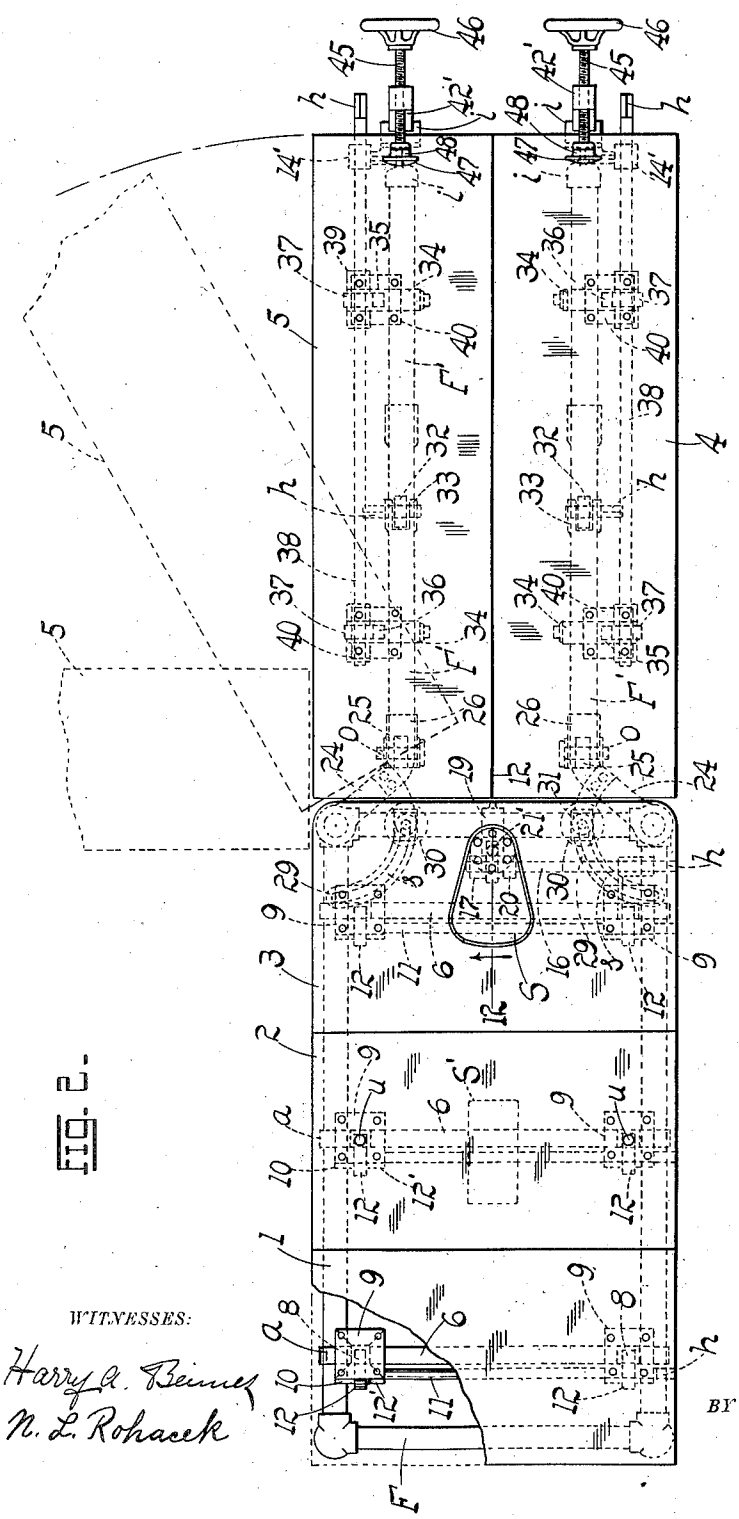


FIG. 2.

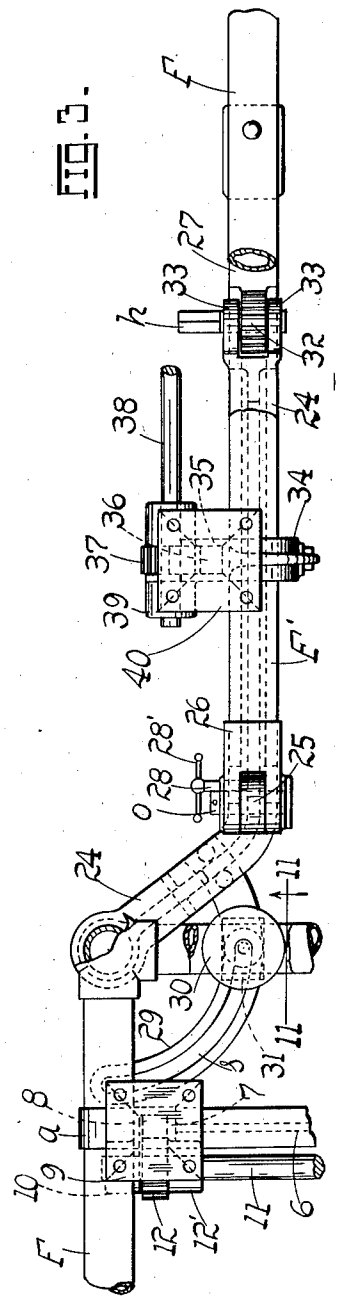


FIG. 3.

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FRACTURE TABLE.

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4 SHEETS—SHEET 3.

FIG. 4.

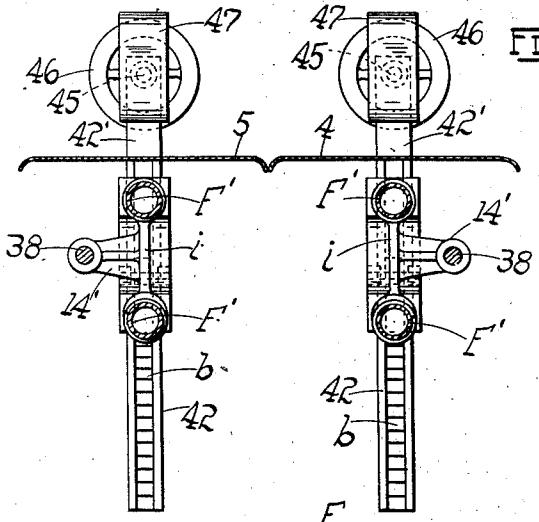



FIG. 6.

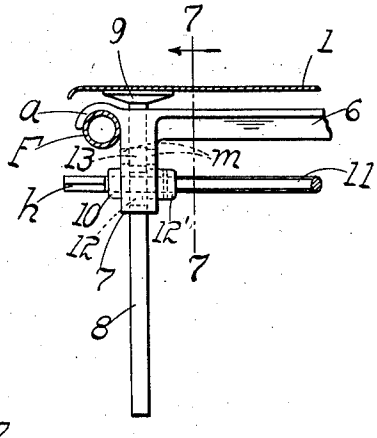



FIG. 5.

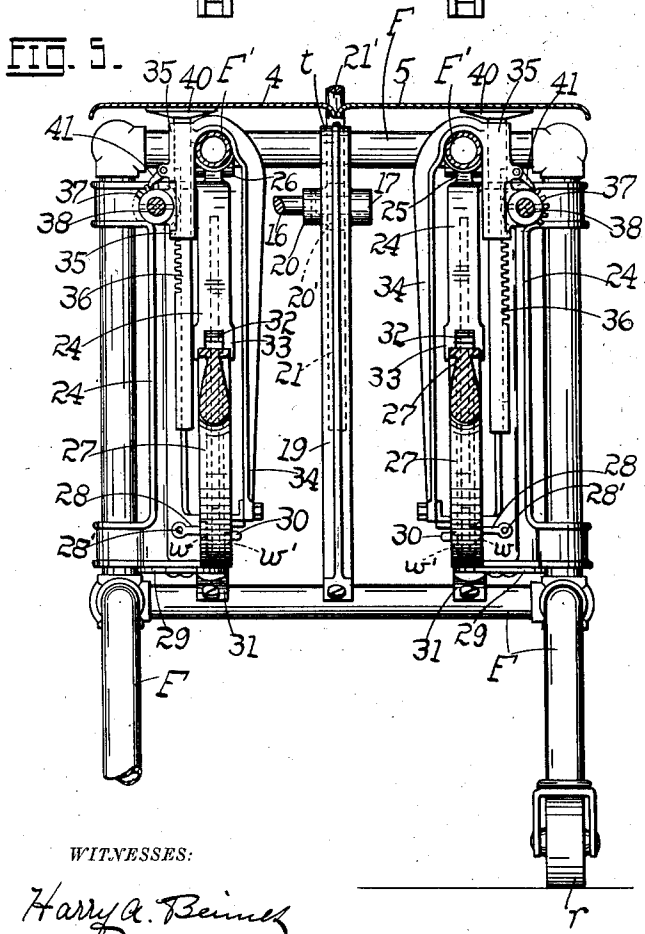



FIG. 7.

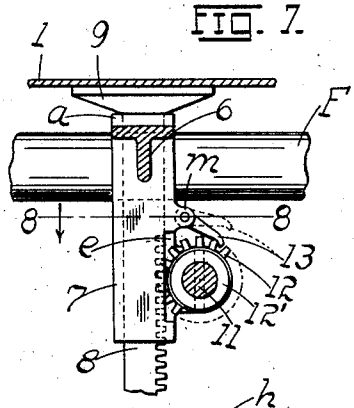
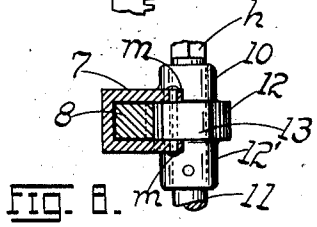



FIG. 8.




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FRACTURE TABLE.

APPLICATION FILED MAY 11, 1914.

**1,113,658.**

Patented Oct. 13, 1914.

4 SHEETS—SHEET 4.

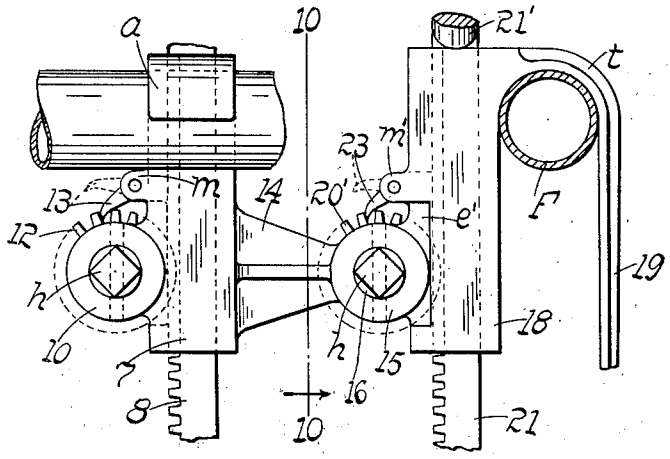



FIG. 9.

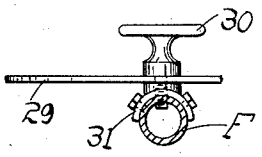



FIG. 11.

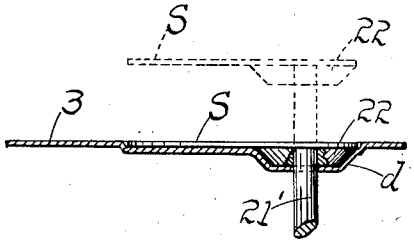
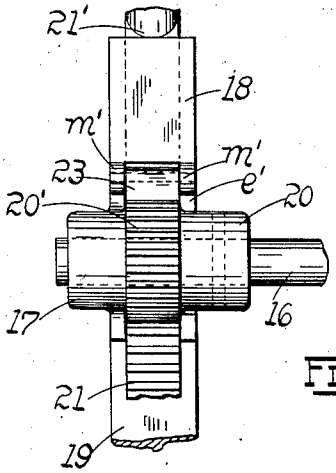



FIG. 12.



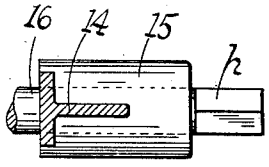




FIG. 10.

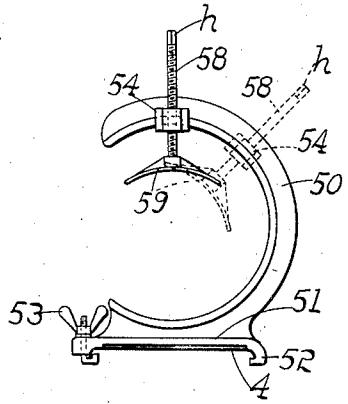



FIG. 16.

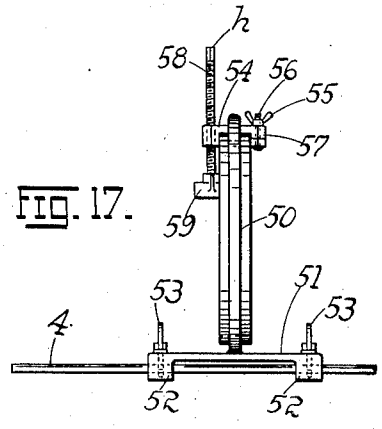



FIG. 17.

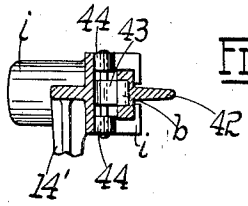



FIG. 13.

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# UNITED STATES PATENT OFFICE.

JOHN CARROLL LANDENBERGER, OF SALT LAKE CITY, UTAH.

## FRACTURE TABLE.

1,113,658. Specification of Letters Patent. Patented Oct. 13, 1914.

Application filed May 11, 1914. Serial No. 837,883.

*To all whom it may concern:*

Be it known that I, JOHN C. LANDENBERGER, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Fracture-Tables, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in fracture tables; and it consists in the novel features of construction more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a side elevation of the table, a portion of the main frame being broken away; Fig. 2 is a top plan, with one of the table sections broken away; Fig. 3 is an enlarged top plan of the main portion of the combined horizontal and vertical oscillating frame supporting one of the table sections; Fig. 4 is a vertical transverse section on the line 4—4 of Fig. 1; Fig. 5 is a vertical transverse section on the line 5—5 of Fig. 1; Fig. 6 is a vertical cross-section on the line 6—6 of Fig. 1; Fig. 7 is a vertical longitudinal section on the line 7—7 of Fig. 6; Fig. 8 is a horizontal sectional detail on the line 8—8 of Fig. 7; Fig. 9 is an enlarged side elevation of the table-and-seat lifting rack-bars identified with the third table-section, and of the guide-sockets or bearings therefor and actuating pinions, the upper frame-tube being in cross-section; Fig. 10 is a vertical cross-section on the line 10—10 of Fig. 9; Fig. 11 is a vertical sectional detail on the line 11—11 of Fig. 3; Fig. 12 is a vertical longitudinal sectional detail through the seat and the third table-section, on the line 12—12 of Fig. 2; Fig. 13 is a horizontal sectional detail on the line 13—13 of Fig. 1; Fig. 14 is a vertical cross-sectional detail on the line 14—14 of Fig. 1; Fig. 15 is a sectional detail showing a conventional form of swivel joint as applied to the foot-plate of the tension bracket; Fig. 16 is a side elevation of a bracket adapted to be attached to one of the table sections for use in operating on the leg of the patient; and Fig. 17 is an edge view of Fig. 16.

The present invention is directed to tables for the reduction and treatment of dislocations of bones, fractures of bones, and other deformities of the human skeleton, whether acquired or congenital.

The object of the invention is to provide a table which is susceptible of a great variety of adjustments with a view of securing access to any portion of the body of the patient deposited on the table, the latter being composed of a series of sections each capable of independent adjustment. These adjustments are in various planes, some horizontal, some vertical and others in inclined planes, each adjustment serving its specific function.

A further object of the invention is to provide means for imposing the necessary tension on a member such as the leg (or arm) to secure a forcible extension of such member.

A further object is to construct a table to the individual sections of which may be applied various and sundry attachments for application of bandages or plaster, and finally to construct a table which will permit of the treatments above referred to, with least inconvenience to the surgeon, and least discomfort to the patient.

The advantages of the invention will be fully apparent from a detailed description thereof, which is as follows:

Referring to the drawings, and for the present to Figs. 1 to 15 inclusive, F represents the main table frame preferably composed of steel tubing with standard fittings screwed together and mounted on casters or rollers *r* whereby the same may be readily wheeled about or made portable. In the present embodiment of my invention I construct the table of five sections, 1, 2, 3, 4, 5. composed either of wood or sheet metal (in the present instance steel being employed), the sections 1, 2, 3, being each susceptible of independent vertical adjustment, and the sections 4, 5, being susceptible of independent adjustments vertically, and radially in horizontal and vertical planes as will more fully hereinafter appear. Disposed across the top of the frame F are braces or bars 6, the terminals *a* of the bars embracing the piping of the frame F (Fig. 6). These bars may be of any conventional structural member type as shown to best advantage in Figs. 6 and 7, and terminate on the inside of the frame F in depending sockets or guides 7 for the free traverse therethrough of the

rack-bars 8. The upper terminals of the rack-bars are provided with heads 9 to which the plate comprising the particular sections 1, 2, 3, is secured. There is a supporting brace or member 6 for each section 1, 2, 3, each section being controlled by a pair of rack-bars, there being a bar at each end of each section, or three rack-bars on each side of the table-frame. Disposed parallel to each member 6 and mounted in the hollow bosses or bearings 10 cast with, or secured to, the guides 7, are shafts 11 terminating on one side of the table in square or polygonal heads *h* to which may be applied the socket of a crank handle H for imparting rotation to the shafts. Carried by each shaft 11 between the side walls of the guide 7 is a pinion 12 which meshes with the teeth of the rack-bar, one of the side walls of the guide 7 having a section *e* removed therefrom for the accommodation of the hub 12′ of the pinion, through which the pinion is secured to the shaft (Figs. 7, 8). It will be seen from the foregoing, that by applying the crank handle H to the head *h* of any shaft 11, and turning the shaft in proper direction, any section 1, 2, 3, may be raised or lowered to any elevation desired. When adjusted to any position the section is maintained at that position by a gravity pawl 13 mounted pivotally between the ears *m* on the guide socket 7, said pawl engaging the teeth of the pinion 12 and preventing rotation thereof. To lower the rack-bars (and hence the particular section of the table) the pawls 13 are lifted out of engagement with their pinions, and the shaft 11 is rotated in proper direction to effect the result. Formed with the guide socket 7 of one of the rack-bars controlling the table section 3, is a bracket 14, the terminal hollow boss 15 of which supports the outer end of a shaft 16, the same being provided with a polygonal head *h* on the order previously described, the inner end of the shaft being supported in the hollow boss 17 cast with one of the side walls of a guide-socket 18 depending from the gooseneck *t* of an anchor bar 19 whose lower end is secured to one of the bottom pipes or tubes of the frame F, the gooseneck passing over one of the upper tubes of said frame. One of the side walls of said guide socket 18 has a section *e′* removed or cut away to accommodate the hub 20 of a pinion 20′ meshing with the teeth of a vertically reciprocating rack-bar 21 having an upper cylindrical extension or resistance post 21′ to which may be attached a seat S, the bottom of the seat having secured thereto a conical block or mounting 22 provided with a socket for receiving the post, the block being in turn receivable in a depression or basin *d* formed in the table section 3, the latter having a suitable portion thereof offset from the surface of the section to permit the seat S to come flush with said surface when the post 21′ has been depressed to its lowest position, (Fig. 12). The shaft 16 may be operated by the crank handle H whose socket fits the heads *h* of the several shafts referred to, whereby the post 21′ with (or without) its seat S may be raised or lowered with the raising or lowering of the table section 3. It may likewise be raised or lowered independently of said section 3, Fig. 1 showing the post with its seat raised above the section, the latter in said figure occupying its lowest position. Like the pinions 12 of the shafts 11, the pinion 20′ is controlled by a locking gravity pawl 23 mounted pivotally between the ears or lugs *m′* of the rack-bar guide 18, said pawl permitting the pinion 20′ to rotate freely in one direction, but locking it against a rotation in the reverse direction. The pawl may however be lifted out from the pinion in which event the shaft 16 may be turned in the opposite direction (for purposes of lowering the rack-bar 21 and seat S carried by the post 21′ thereof).

We will now direct our attention to the table sections 4 and 5 and to the mechanism by which the various adjustments may be imparted thereto; and since these two sections are identical in construction, a description of one of the sections will answer for both. In Fig. 3 the table-section 5 and the section 3 are removed, thereby exposing the supporting substructure, the elevation of the latter being shown to good advantage in Fig. 1. Hinged to the inner vertical terminal tube on each side of the frame F, (Fig. 1) is a laterally swinging frame or wing 24 bent outwardly at a point adjacent the hinge axis thereof, (Fig. 3), the free edge of the wing being curved to follow the arc of a circle, the center of which is at a point on top of the wing adjacent the angle of the bend. At this point is formed a lug 25 to which is hinged the forked end of a fitting 26 forming the inner terminal of the upper tubular member of a vertically oscillating tube-frame F′, said frame containing as a feature of construction the arcuate rack-bar 27, the lower free end of which is provided with lugs *w*, *w′*, embracing the curved portion of the wing 24, the lug *w* carrying a set-screw 28 provided with a handle 28′ by which the rack 27 may be clamped to the wing in any position to which said rack may be adjusted along said wing, it being understood that the frame F′ with its rack 27 oscillates in a vertical plane about the axis of the hinge-pin *o* on the lug 25. Secured to the base of the wing 24 at a point adjacent the bend in the wing and in proximity to the hinge axis of said wing, is a curved slotted plate or quadrant 29, the slot *s* whereof traverses the screw-stem of a clamp screw 30 screwed to the bottom hori-

zontal tube of the frame F, a curved reinforcing plate 31 being secured about the tube to afford the screw a more extended bearing (Fig. 11.) It will be seen from the connections described, that the frame F′ being thus susceptible of a vertical radial sweep about the axis of the hinge-pin *o* can impart an inclination to the table section (4, 5) in a vertical plane, (dotted position Fig. 1) the screw 28 clamping it at any desired angle when once adjusted thereto; and it will be further seen that the wing 24 being susceptible of a horizontal oscillation about its axis (or the axis of the vertical tube of the frame F) in which oscillation it carries the frame F′ and the rack 27 with it, can impart a horizontal oscillation to the section (4,5), which when once adjusted to the desired degree is clamped against displacement by the screw 30. The slot *s* is of sufficient length to permit of a horizontal sweep of the table section through an arc of ninety degrees (dotted position Fig. 2). To impart a vertical oscillation to the frame F′ (and hence to either table section 4,5,) I provide the wing 24 with a pinion 32, the spindle whereof is mounted between the fork members or lugs 33 at the upper end of the arcuate portion of the wing, the spindle terminating in a square or polygonal head *h* for application of the crank handle H thereto. The pinion 32 is in mesh with the rack 27, and by rotating the pinion in proper direction, the rack may be oscillated vertically through any desired angle, thereby imparting a corresponding inclination to the frame F′, and to the table section resting thereon.

The table section (4, 5,) is susceptible of a bodily vertical adjustment in the manner already described in connection with the sections 1, 2, 3, said adjustment being effected by the following mechanism: Secured at its lower end to the side of the rack 27 and hooked or goose-necked over the upper tube member of the frame F′ is a brace 34, the upper end or that beyond the goose-neck being provided with a depending rack-bar guide or socket 35 on the order of the guide 7 previously described. Spaced from the brace 34 and secured at its lower end to the bottom tube member of the frame F′ and hooked over the upper tube member of said frame is a second brace 34′ terminating at the top in a depending rack-bar guide or socket 35′ (Fig. 1), each of the guides 35, 35′, being traversable by a rack-bar 36 which is actuated by a pinion 37, on a pinion shaft 38 disposed longitudinally of the table section (4, 5,) and terminating at its outer end in a polygonal head *h* for application of the crank-handle H thereto. The shaft 38 is mounted in bearings 39 cast with the respective guides 35, 35′, on the order of that already described in connection with the shafts 11, 16, and there is thus no occasion to repeat this detail. The shaft is further supported by the bracket 14′ leading from the terminal fitting *i* of the frame F′. The upper ends of the rack-bars 36 terminate in heads 40 to which the table section (4, 5,) is directly secured. By imparting rotation to the pinion shaft 38 in proper direction, the table section (4, 5,) may be bodily raised or lowered as desired. Like the pinions 12, 20′, the pinions 37 are controlled by gravity pawls 41 which when lifted allow the pinions 37 to rotate in proper direction to permit depression of their rack-bars.

Mounted in suitable guide-ways or grooves formed by the terminal fitting *i* at the free end of each table section 4, 5, is a vertically adjustable tension bracket 42, preferably T-shaped in cross-section (Fig. 13), the inner face of which has disposed thereon rack teeth *b*, with which coöperates a gravity pawl 43 hinged between the ears or lugs 44 on said fitting *i*. The pawl is free to ride over the teeth *b* with an upward adjustment of the bracket, and may be disengaged by hand to allow for a depression of the bracket as obvious from the drawings. The bracket 42 is manipulated by hand in the present embodiment of my invention. At the end of the upper extension or arm 42′ of the bracket is mounted a screw 45 provided at the outer end with a hand-wheel 46, the inner end of the screw having swiveled thereto (by any conventional form of swivel joint, see Fig. 15) a foot-plate 47 provided with loops 48 for the insertion of straps, bands or equivalent means (not shown) for securing the foot of the patient, the purpose of which foot plate will more fully hereinafter appear. The table section 2 is provided with sockets *u* for the insertion of portable resistance posts 49 whose purpose will presently appear.

In Figs. 16, 17, I show one of many forms of attachments which may be applied to my improved table. The said figures represent a bracket 50 with a bottom plate or platform 51 provided with lips 52 for embracing the edges of a table section (4) thus providing a tongue and groove connection permitting the bracket to be moved along the table and clamped where desired by the clamping nut 53. The bracket 50 carries a sliding bearing or block 54 which is slipped over the bracket from the free end thereof and when the block has been adjusted to its proper position on the bracket it is made fast thereto by a clamping nut 55 operating on a screw-stem 56 carried by the block and passed through a detachable clamping-block 57 coöperating with the block 54. The bracket 50 is substantially semicircular, and by moving the block 54 thereover, any angular disposition thereof may be secured. The block 54 carries a screw 58 terminating at its outer end in a polygonal head *h* for ap-

plying the crank handle H thereto, the inner end of the screw having swiveled thereto a bowed plate or leg clamp 59 as shown.

The operation of the table may be set forth sufficiently by enumerating several uses to which the same may be put, and is substantially as follows: It will be noted that the several sections (1, 2, 3, 4, 5,) of the table are capable of independent adjustments and in different directions. Sections 1, 2, 3, may be adjusted bodily vertically, their supporting surfaces being always disposed in horizontal planes; sections 4 and 5 may be similarly adjusted, and in addition may be swung horizontally to and from each other, and to and from the central longitudinal axis of the table, and may at the same time be oscillated vertically so as to assume various inclinations to the planes of support of the sections 1, 2, 3. These various adjustments make it possible to cause the patient to assume any desired position on the table, and permit ready access to any portion of his body. In fractures or dislocations, or other deformities of the bones of the legs, wherein it is desired to apply forcible extension to the legs, the table is so arranged that the resistance post 21′ is against the perineum of the patient whose foot is attached to the swiveled foot plate 47, when, by rotating the handwheel 46 (and hence the screw 45) any desired extension of the leg may be made. Space for applying splints with bandages, or plaster of Paris, or other suitable dressing can be had by elevating sections 1, 2, 3, resistance post 21′ and tension bracket 42, with section 4 or 5 or both lowered. Again, the leg or legs can be abducted laterally or raised vertically, or both together to any desired position and locked, by reason of the angular horizontal and vertical adjustments that may be imparted to the sections 4, 5; and in any position, forcible extension may always be made by a proper manipulation of the hand-wheel 46, the bracket 42 of which is likewise susceptible of adjustment in paths at right angles to the plane of the section (4, 5,) supporting the same. If it is desired to apply bandage or plaster about the whole of the leg and hip and around the abdomen, and back up to the costal margins at the same time, the sacrum of the patient may rest on the seat plate S which has been elevated with the resistance post 21′, sections 1, 2, and tension device elevated, while sections 3, 4, 5, are lowered (Fig. 1). In fractures or dislocations or other deformities of the bones of the arm wherein it is desired to apply forcible extension to the arms, the detachable resistance post 49 is deposited in its socket *u* (Fig. 2) which brings it at the axilla of the patient, the hand of the patient being attached to any suitable tension device (not shown) positioned where convenient on the table, such device being on the order of the tension device 45, 46, 47 above alluded to.

In the drawings, I illustrate a seat-plate S and resistance post therefor in connection with the section 3, but it is obvious that I may equip any other section such as the section 2 with a similar seat-plate S′ or other form of lift, as indicated in dotted outline in Fig. 2. Such a plate (on section 2) would form a shoulder seat-plate; and where it was desired to extend a bandage or plaster around the shoulder and chest, the dorsal vertebræ would rest on said shoulder seat-plate (see Fig. 2) elevated with sections 1, 3, 4, 5, while section 2 was lowered, allowing space for application of the bandage or plaster, or dressing.

In fractures, dislocations, diseases, or deformities of the bones of the spine, jackets of plaster or other material may be applied with the patient lying face downward, while sections 1, 4, 5, are elevated, and sections 2, 3, are lowered, the chest and abdomen of the patient resting on a hammock (not shown) swung from the ends of the sections 1, 4 and 5. Plaster jackets may be applied while the patient is lying upon his (or her) back, with sections 1, 4, 5, elevated, and 2, and 3 lowered, the entire back of the patient resting on two bars of metal (not shown) one on either side of the spine from the base of the neck to the sacrum, said bars resting with their ends on suitable supports (not shown) on the sections 1, 4 and 5. The tension device (or devices) are of course not always called into requisition, the use of the table including the application of bandages or plaster of Paris or other materials on the trunk or extremities of patients without using the tension devices.

The table or sections thereof are susceptible of use in connection with many attachments or adjuncts not permanently secured thereto and forming no part of the table. Such for example are the portable resistance posts 49 above referred to and other attachments not illustrated. In Figs. 16 and 17 however, I illustrate a bracket 50 which is adjustable along either section 4 or 5, the clamp 59 at the end of the tension screw 58 being adjustable circularly along the bracket as described, and susceptible of use in connection with operations of the leg where it may be desired to impose on the leg a pressure or pull from some particular direction and at some predetermined angle. A single illustration of the various attachments which may be of service in connection with my table is deemed sufficient, as the other attachments *per se* constitute independent inventions.

I do not wish to limit myself to the specific mechanical details here shown which are instrumental in bringing about the sev-

eral adjustments of the various table sections, or to the specific means for locking the sections in their adjusted positions, or to the material and construction of the table frame. All these may be changed and varied to suit the pleasure of the manufacturer without departing from the nature or spirit of my invention. Neither do I wish to limit myself to any particular number of sections composing the table; nor to the uses to which the table may be put.

The vertical adjustment of the sections 4, 5, is not limited to the horizontal position of said sections, for it is obvious that the pinion shaft 38 might be actuated while these table sections were at an incline to the horizontal, in which actuation the sections would be moved bodily in planes parallel to the supporting surfaces of the sections, the same as when the sections occupied a horizontal position. The "vertical" adjustment of these sections therefore is not to be understood as being limited to a literal vertical adjustment, or that identified with a horizontal disposition of said sections. It may also be stated in passing, that the several sections of the table may be raised or lowered simultaneously, the independent operating mechanisms of the several sections not precluding such a possibility.

Having described my invention, what I claim is:—

1. A fracture table comprising a series of independently vertically adjustable sections having substantially horizontal disposed supporting surfaces, sections adjacent to one of the terminal members of said series disposed on opposite sides of the central axis of the table and capable of independent lateral or horizontal oscillation to and from said axis and of independent vertical adjustment in horizontal planes.

2. A fracture table comprising a series of independently vertically adjustable sections having substantially horizontal supporting surfaces, sections adjacent to one of the terminal members of said series disposed on opposite sides of the central axis of the table and capable of horizontal oscillation to and from said axis, said oscillating sections being susceptible of independent vertical oscillation, and of independent vertical adjustment.

3. In a fracture table, a series of adjacent vertically adjustable sections having horizontal supporting surfaces, an independent hinged section mounted adjacent to one of the terminal members of said series, a resistance post on said terminal member positioned to engage the perineum of the patient, a vertically adjustable tension device on the hinged section, and horizontally adjustable member on said tension device for engaging the foot of the patient.

4. In a fracture table, a series of vertically adjustable sections, an independently vertically adjustable seat-supporting resistance post positioned on one of the sections to engage the perineum of the patient, and means on an adjacent section for securing a resistance post for engaging the axilla of the patient.

5. A fracture table comprising a suitable frame, a series of table sections having horizontal supporting surfaces carried thereby, rack-bars engaging the sections, guides for the rack-bars supported by the frame aforesaid, pinions engaging the rack-bars, means for actuating the pinions, a rack-and-pinion actuated resistance post on one of the sections, a pair of table sections hinged to the frame adjacent to the section supporting the resistance post, and tension members on said hinged sections coöperating with said resistance post.

6. A fracture table comprising a frame, a series of vertically adjustable table sections mounted thereon, wings hinged at the ends of the sides of the frame adjacent to one of the terminal sections of the series aforesaid, said wings oscillating in horizontal planes, a frame hinged to each of the wings and oscillating independently thereof in a vertical plane, means coupling the wings and their respective frames to permit the latter to participate with the wings in the horizontal oscillations of the wings, means for clamping the wings in any position to which the same may be swung, means for locking the oscillating frames to the wings for any position of the frames, and table sections mounted on the frames.

7. A fracture table comprising a frame, a series of vertically adjustable table sections mounted thereon, wings mounted at the ends of the sides of the frame adjacent to one of the terminal sections of the series aforesaid, and oscillating in horizontal planes, the free edges of the wings having an arcuate formation disposed in a vertical plane, a frame hinged to each wing about the center of said arcuate formation as an axis and oscillating in a vertical plane, an arcuate rack-bar on said hinged frame sweeping opposite the arcuate portion of the wing, means on the frame at one end of the rack for clamping the rack and the frame to the wing for any position of the rack along the wing, a pinion at one end of the arcuate portion of the wing for engaging the rack, means for actuating the pinions, a table section mounted on the hinged frame, and means on the frame for adjusting said table section vertically or to and from the frame independently of the oscillations of the frame, whereby said table section may oscillate horizontally with the wing and its frame, or vertically with the frame, or be adjusted bodily to and from and independently of, the frame.

8. In a fracture table, a combined verti-

cally and horizontally oscillating frame, a table section mounted thereon, and adjustable vertically independently of the frame, a vertically adjustable tension-bracket at the free end of the frame, said bracket having an extension projecting above the table section, a tension screw on said bracket, a swiveled foot-plate carried by said screw above the table section, a support for the patient adjacent and beyond the hinge axes of the frame, and a resistance post on said support.

9. In a fracture table of the character described, a supporting frame, a wing hinged thereto and oscillatable in a horizontal plane, a frame hinged to the wing and operating to swing conjointly therewith in said horizontal plane, and independently thereof in a vertical plane, and a table on said frame adjustable to and from the frame and participating in the oscillations of the frame.

10. In a fracture table of the character described, a swinging frame, a series of rack-bars mounted thereon, guides for the rack-bars, a pinion shaft, pinions on the shaft opposite the guides for engaging the rack-bars, a table section secured to the rack-bars above the frame, and suitable pawls for the pinions.

11. In a fracture table of the character described, a frame, an oscillating wing hinged thereto and having a bend formed therein at a point adjacent the hinge axis thereof, a slotted quadrant carried by the wing adjacent the bend aforesaid, and a clamping screw on the frame having a stem traversing the slot of said quadrant.

In testimony whereof I affix my signature, in presence of two witnesses.

JOHN CARROLL LANDENBERGER.

Witnesses:
FRANK K. NELSON,
S. H. PINKERTON.