

Feb. 13, 1962

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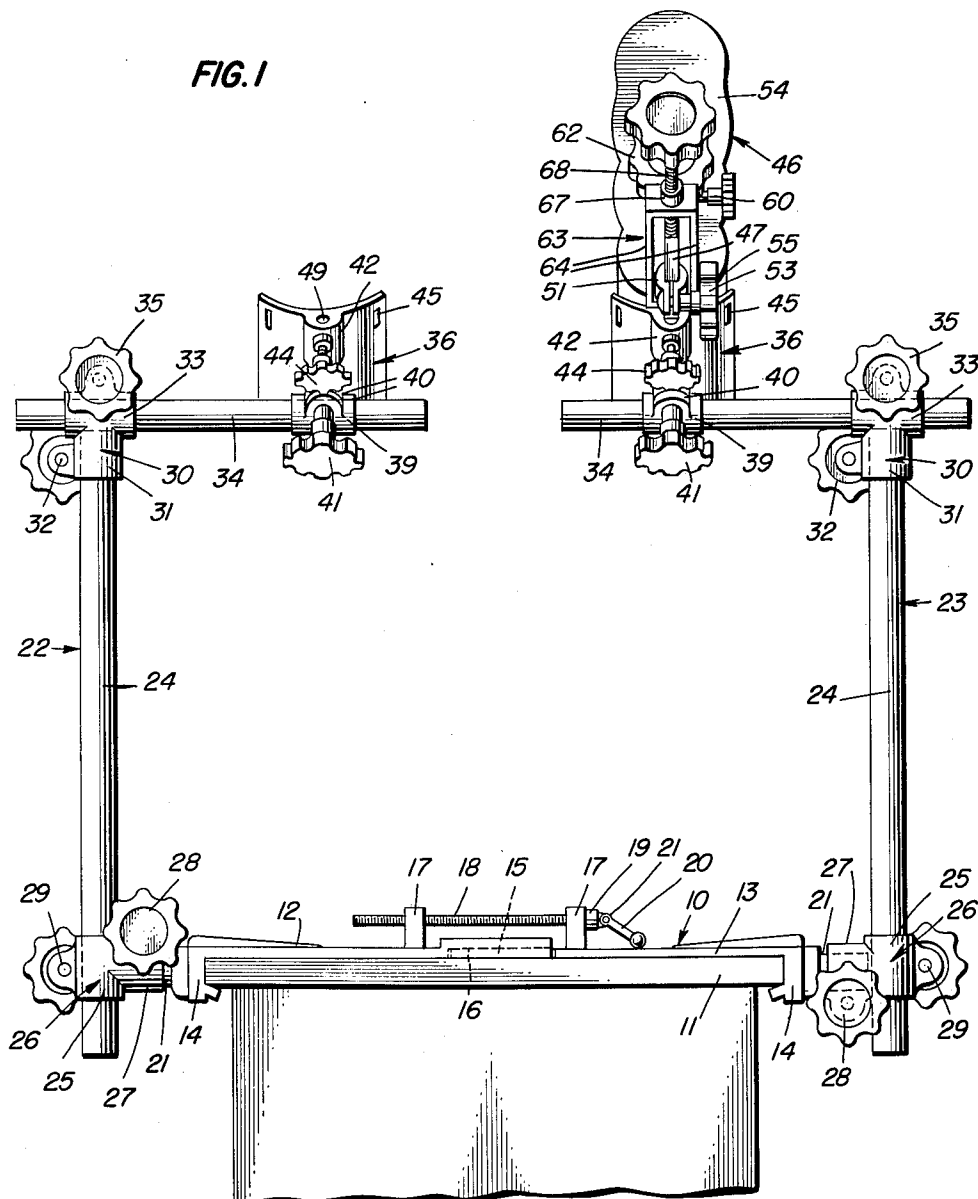
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LIMB SUPPORTING ATTACHMENT FOR OPERATING TABLES

Filed June 18, 1958

7 Sheets-Sheet 1

FIG. 1



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FIG. 2

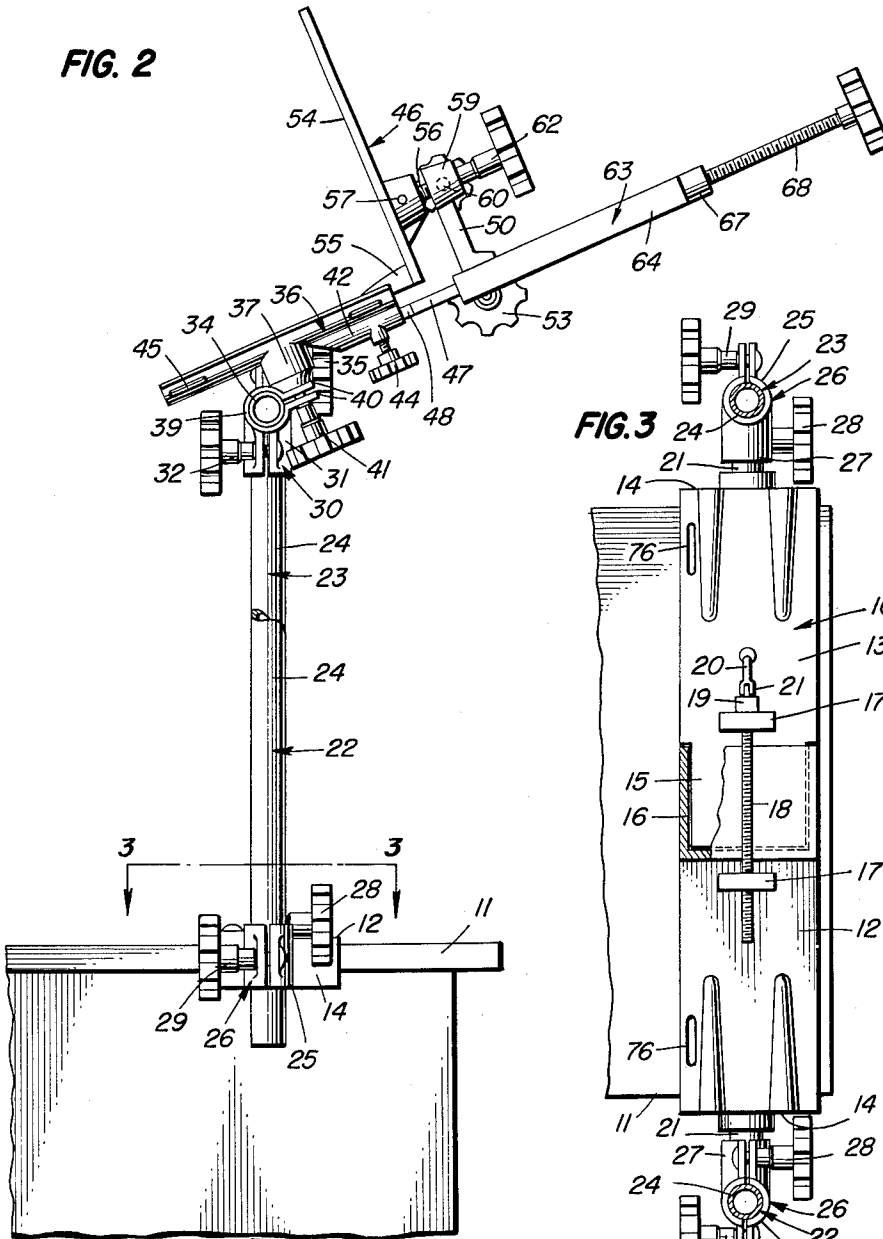
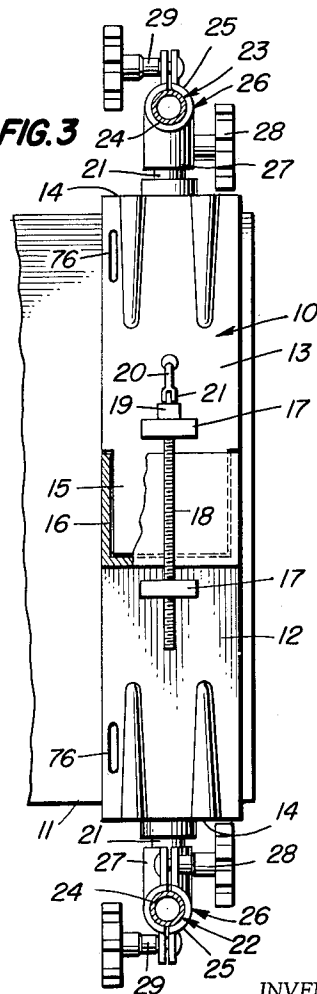


FIG. 3



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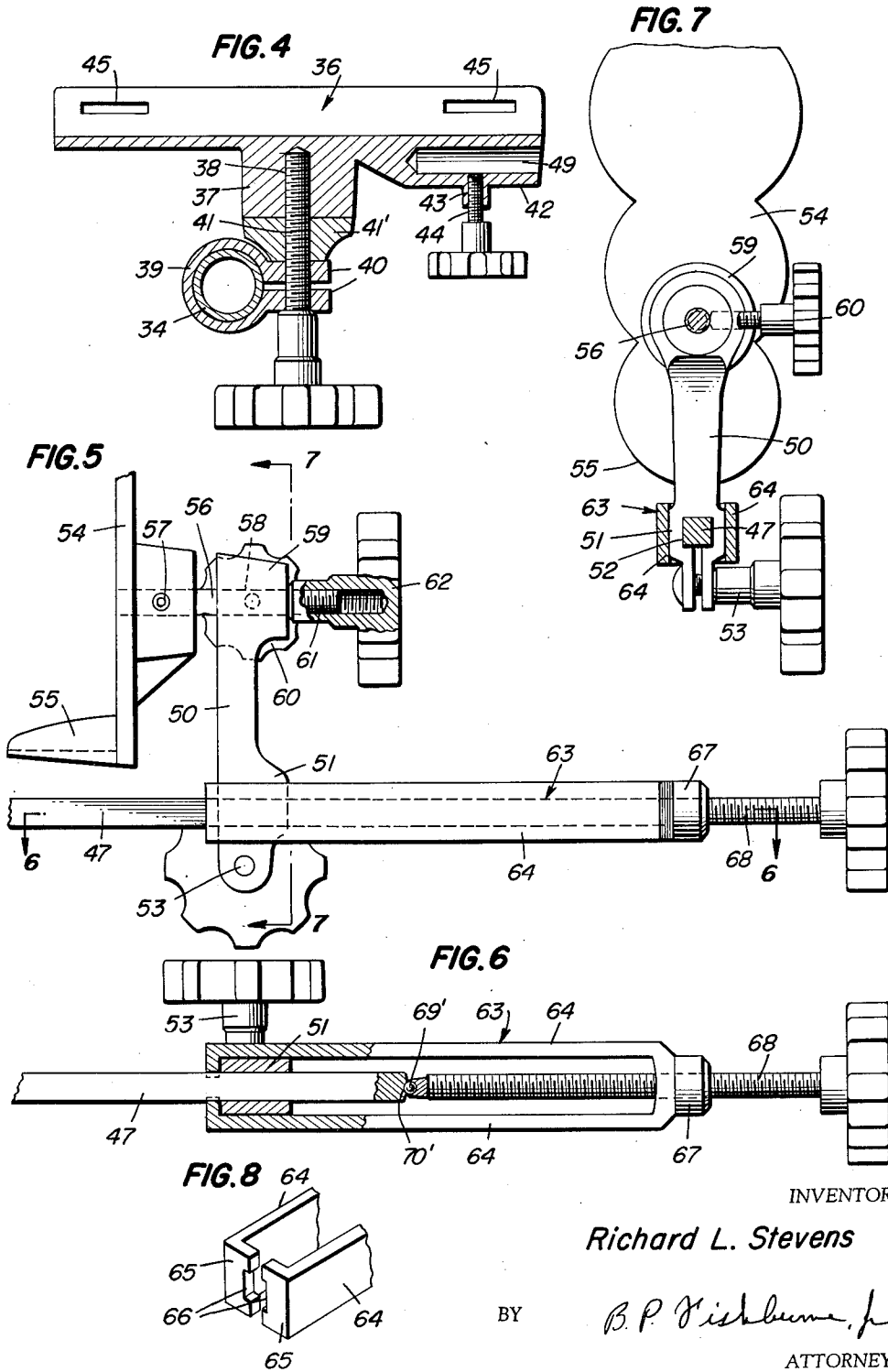
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LIMB SUPPORTING ATTACHMENT FOR OPERATING TABLES

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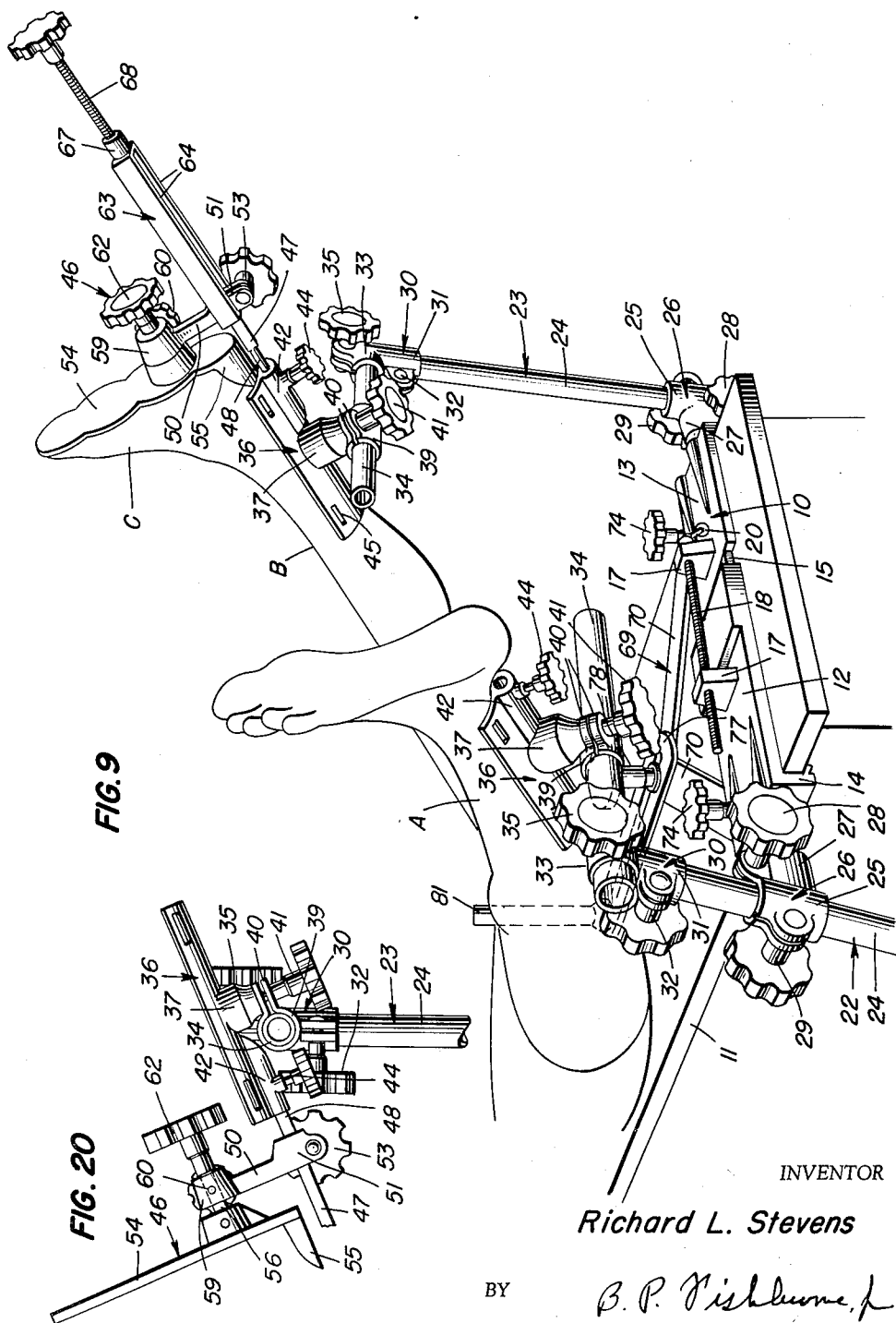
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LIMB SUPPORTING ATTACHMENT FOR OPERATING TABLES

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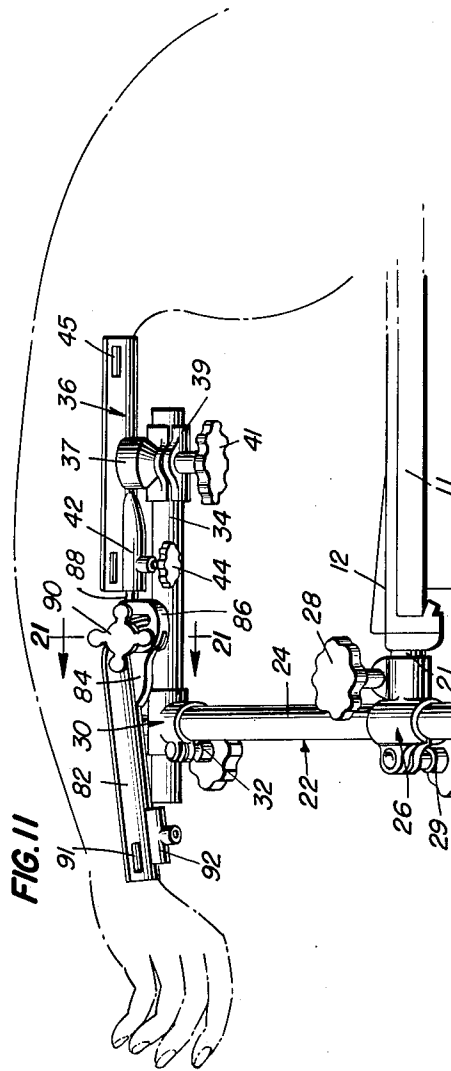
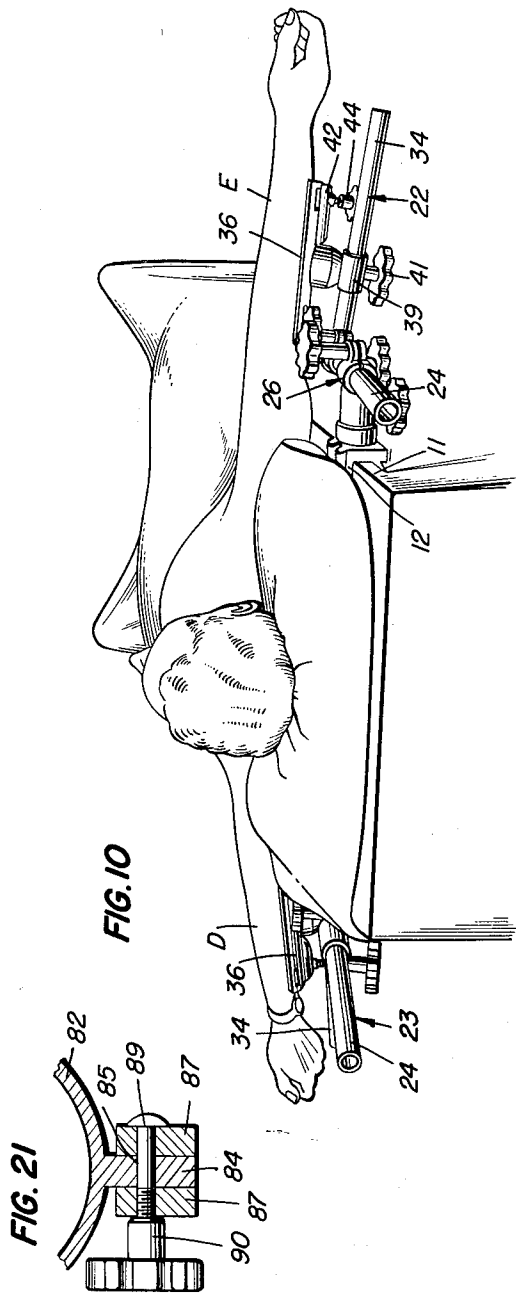
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LIMB SUPPORTING ATTACHMENT FOR OPERATING TABLES

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LIMB SUPPORTING ATTACHMENT FOR OPERATING TABLES

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FIG. 12

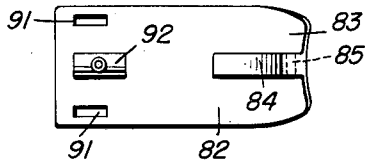


FIG. 13

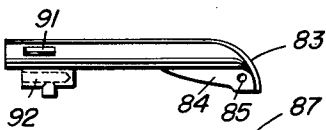


FIG. 14

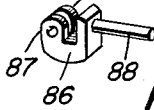


FIG. 15

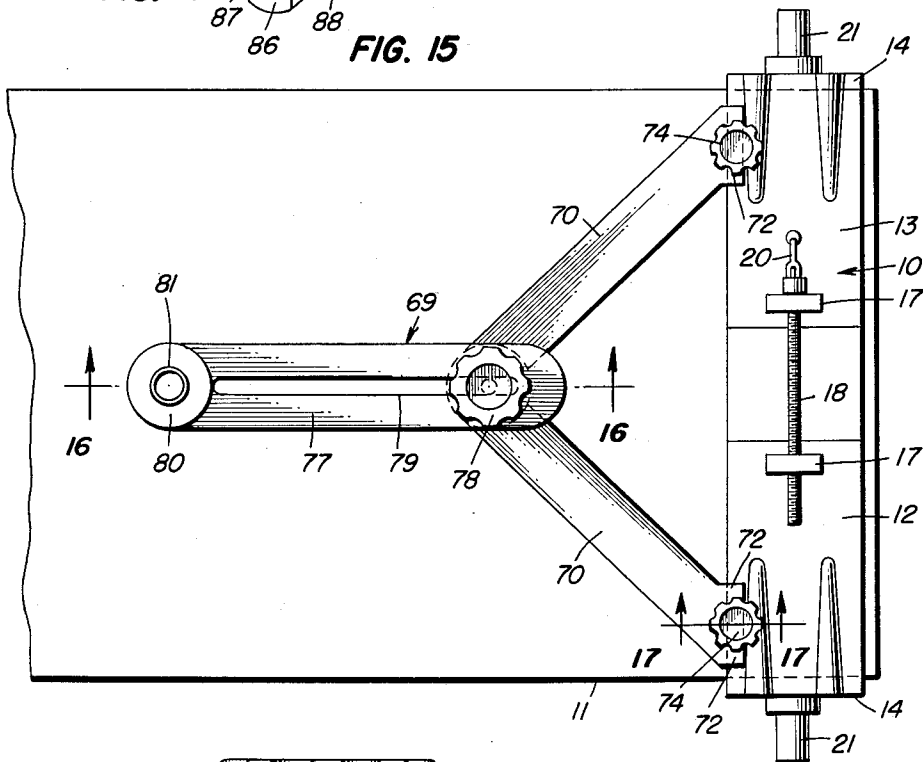


FIG. 17

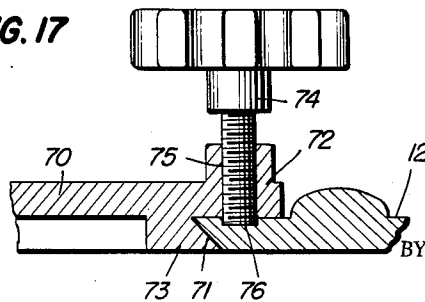
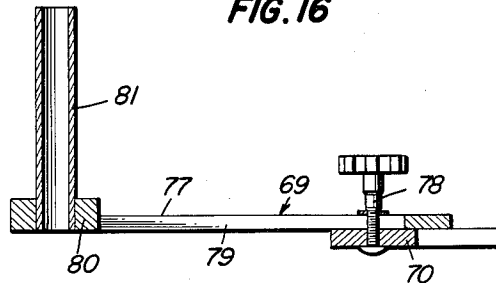


FIG. 16



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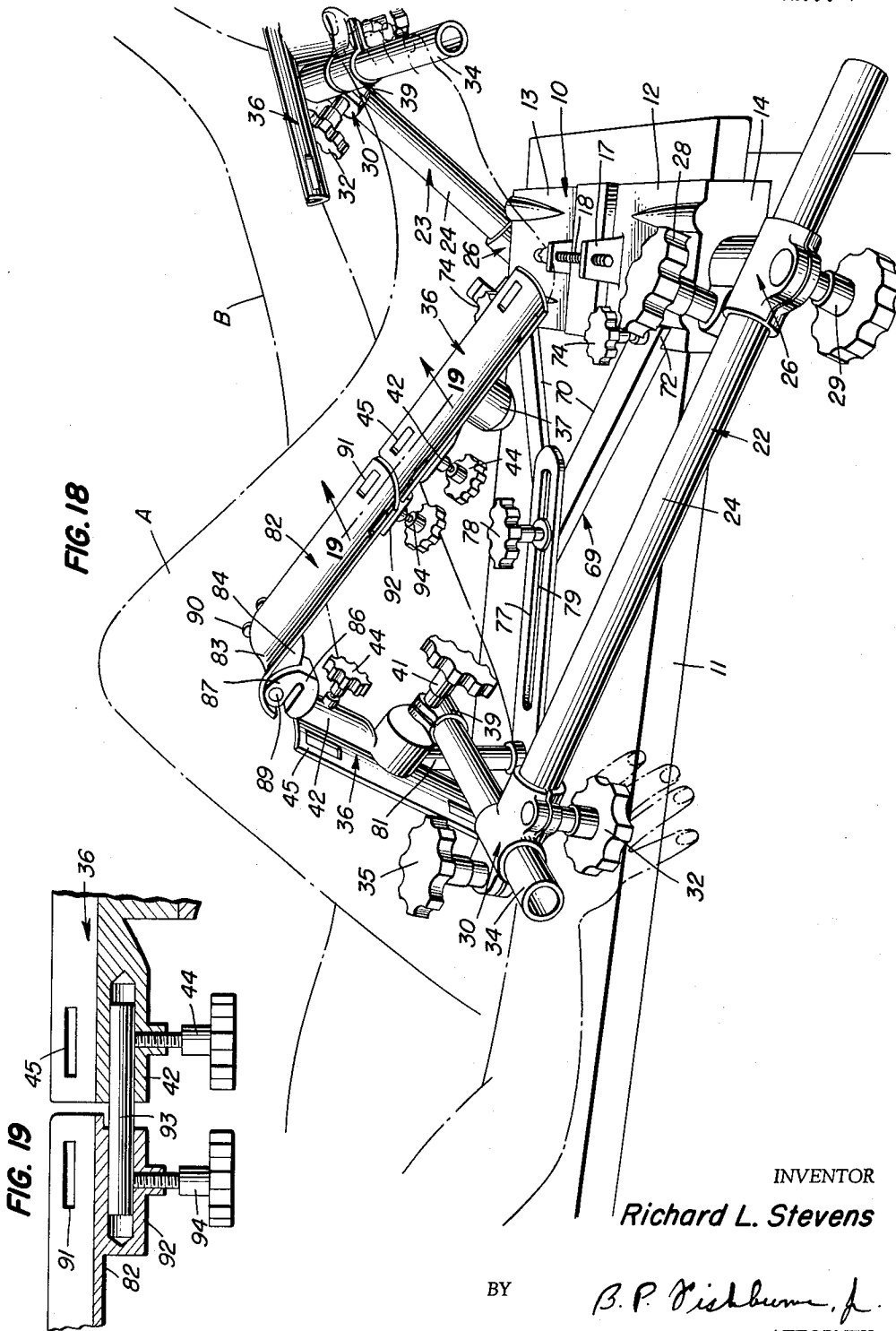
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LIMB SUPPORTING ATTACHMENT FOR OPERATING TABLES

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7 Sheets-Sheet 7



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**LIMB SUPPORTING ATTACHMENT FOR
OPERATING TABLES**

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Filed June 18, 1958, Ser. No. 742,934
10 Claims. (Cl. 128—70)**

The present invention relates to limb supporting devices for operating tables and the like.

An important object of the invention is to provide a complete and self-contained limb supporting attachment for standard operating tables, the use of which attachment permits the standard operating table to be used for various operations, which heretofore could only have been performed on a special fracture table.

A further object of the invention is to provide limb supporting means of the above-mentioned character which dispenses entirely with the need for manually supporting the limbs of a patient during orthopedic operations, the setting of fractures and the like.

Another object of the invention is to provide limb supporting means of the above-mentioned character which are highly adjustable and versatile in use, whereby the limbs of the patient may be supported with stability in a variety of positions during operations, to the mutual advantage of the patient and doctor.

A further object is to provide a limb supporting attachment which is readily adjustable to fit operating tables of different sizes, and requiring no structural alterations whatsoever of the operating table for installation and use of the attachment.

A further object of the invention is to provide a limb supporting attachment of the above-mentioned character which may be readily installed and operated by unskilled personnel, in order to position the limbs of the patient in a variety of positions necessary to meet the needs of the surgeon or doctor.

Still another object of the invention is to provide a device of the above-mentioned character which is extremely sturdy in construction, reliable in operation, readily collapsible for storage and shipment, and relatively inexpensive to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

FIGURE 1 is a front elevational view of a limb supporting device in accordance with the invention and showing the same mounted upon an operating table.

FIGURE 2 is a side elevation of the device shown in FIGURE 1 with parts broken away.

FIGURE 3 is a horizontal cross section taken on line 3—3 of FIGURE 2, partly in section.

FIGURE 4 is a central vertical longitudinal section through a limb supporting plate and associated elements.

FIGURE 5 is a fragmentary side elevation of a traction attachment forming a part of the invention, partly in section.

FIGURE 6 is a horizontal section taken on line 6—6 of FIGURE 5, parts in elevation.

FIGURE 7 is a transverse vertical section taken on line 7—7 of FIGURE 5.

FIGURE 8 is a fragmentary perspective view of a yoke forming a part of the traction attachment.

FIGURE 9 is a perspective view of the limb supporting device in one adjusted position and illustrating uses of the same.

FIGURES 10 and 11 are further perspective views of

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the device showing different adjustments and uses of the same.

FIGURE 12 is a bottom plan view of a modified form of limb supporting plate constituting a part of the invention.

FIGURE 13 is a side elevation of the same.

FIGURE 14 is a perspective view of a hinge part employed with the plate shown in FIGURES 12 and 13.

FIGURE 15 is a plan view of a body stabilizing device employed in certain instances with the device of the invention.

FIGURE 16 is a longitudinal vertical section taken on line 16—16 of FIGURE 15.

FIGURE 17 is an enlarged vertical section taken on line 17—17 of FIGURE 15.

FIGURE 18 is a further perspective view of the limb supporting device shown in use for supporting a patient's limb in a bent or flexed position.

FIGURE 19 is an enlarged fragmentary section on line 19—19 of FIGURE 18.

FIGURE 20 is a fragmentary side elevation of the traction attachment in reversed position.

FIGURE 21 is an enlarged fragmentary section on line 21—21 of FIGURE 11.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 10 designates generally an adjustable clamp for rigidly adjustably securing the limb supporting device to the top 11 of an operating table or the like. The clamp 10 comprises a companion pair of generally L-shaped clamp parts 12 and 13, adapted to rest upon the table top 11, transversely thereof, and to have their outer depending portions 14 grip the opposite longitudinal edges of the table top, as shown in the drawings. The clamp part 13 is provided at its inner end with a reduced extension or tongue 15, engaging within a recess 16 formed in the inner end and bottom of the clamp part 12.

Near their inner ends, the clamp parts 12 and 13 carry upstanding lugs 17, rigidly secured thereto. The lug 17 of the clamp part 12 is provided with a horizontal screw-threaded opening for the reception of a horizontal adjusting or clamp screw 18, which screw is freely rotatably received with in an unthreaded opening formed through the lug 17 of the clamp part 13. The screw 18 is provided at one end with an enlarged head 19 integral therewith and engaging the outer side of the lug 17 of clamp part 13 for preventing the screw 18 from shifting longitudinally in one direction relative to the adjacent lug 17. A turning handle 20 for the adjusting screw 18 is pivoted thereto at 21 to facilitate turning the screw 18 in order to bring the clamp 10 into gripping engagement with the top 11 of the operating table. The construction of the clamp 10 is such that it is adjustable a substantial amount so that the clamp may be applied to various sizes or widths of operating tables.

Each clamp part 12 and 13 is provided at its outer end with an integral horizontal outwardly projecting trunnion 21. A companion pair of separate L-shaped adjustable limb supporting units 22 and 23 is bodily carried by the trunnions 21 of the clamp 10 as shown in FIGURE 1.

Each of the units 22 and 23 embodies a longitudinally adjustable and vertically swingable elongated rigid bar 24, frictionally held within a first split sleeve 25 of a T-shaped coupling 26, which coupling includes a second inwardly projecting horizontal split sleeve 27, integral therewith and extending at right angles to the first sleeve 25. The split sleeve 27 of each T-shaped coupling 26 receives therein one of the horizontal trunnions 21 of the clamp 10, and the split sleeve 27 is adjustably frictionally clamped to the trunnion 21 by a conventional screw-threaded clamping device 28, as shown in the drawings.

Similarly, each split sleeve 25 is frictionally clamped to the elongated bar 24 by a similar adjustable screw-threaded clamping device 29, as shown. By this means, each unit 22 and 23 may be bodily turned or adjusted in a vertical plane about the horizontal axis of the associated trunnions 21, and tightly clamped in the selected adjusted position by the clamping device 28. Likewise, each bar 24 may be readily adjusted longitudinally through the split sleeve 25 for a desired amount and then tightly clamped in the selected adjusted position by the clamping device 29.

A T-shaped coupling 30 substantially identical to the coupling 26 is mounted upon the upper end of the bar 24 of each unit 22 and 23. Each coupling 30 comprises a first split sleeve 31 receiving the upper end of the bar 24, and frictionally clamped thereto by a screw-threaded clamping device 32. Each coupling 30 further comprises a second split sleeve 33 integral therewith, and extending at right angles to the sleeve 31, and receiving therein a relatively short inwardly extending horizontal rigid bar 34. The bar 34 is adjustably clamped within the split sleeve 33 by another screw-threaded clamping device 35, identical with the screw-threaded clamping devices previously described. By this means, each bar 34 may be readily adjusted longitudinally inwardly or outwardly within the split sleeve 33 and also turned upon its longitudinal axis for a full 360 degrees. The bar 34 may be locked in the selected adjusted position by the tightening of the screw-threaded clamping device 35.

Each limb supporting unit 22 and 23 may further comprise a somewhat elongated generally rectangular transversely concave limb supporting plate 36, adjustably mounted upon the horizontal transverse bar 34. Each limb supporting plate 36 is provided upon its bottom and at its longitudinal and transverse centers with an integral depending boss 37, having a screw-threaded opening 38. A spacer element 41' having an unthreaded opening is arranged beneath the boss 37, FIGURE 4. A split sleeve 39 is adjustably mounted upon the bar 34 below the plate 36, and has a pair of integral apertured lugs 40, receiving therethrough a clamping adjusting screw 41, which has screw-threaded engagement within the screw-threaded opening 38. By this means, each plate 36 may be readily adjusted longitudinally and circumferentially of its supporting bar 34 and clamped in the selected adjusted position by the tightening of the screw 41. Additionally, each plate 36 may be turned any desired amount about the axis of the screw 41 prior to tightening of the screw.

Each limb supporting plate 36 is further provided upon its lower side and near one end thereof and at its transverse center with an integral longitudinal tubular boss 42, for a purpose to be described, and having a lateral screw-threaded opening 43 receiving a clamping set screw 44. Each plate 36 is further provided near its corners with slots 45 for flexible straps, not shown, employed when desired to secure the limb of the patient firmly to the plate 36. The limb supporting plates 36 of the units 22 and 23 may be used alone on either or both units 22 and 23, or they may be employed in conjunction with other attachments on either or both units 22 and 23, as will presently be described.

As shown in FIGURES 1, 2 and 9, the limb supporting plate 36 of the adjustable unit 23 is shown carrying a traction attachment 46. This traction attachment is employed when it is desired to place the supported limb of the patient in traction as while setting a fracture of the leg, or the like. The traction attachment 46 comprises an elongated shaft 47 which is square in cross section throughout a major portion of its length, but including one end portion 48 which is circular in cross section, for engagement within the cylindrical bore 49 of the boss 42 on limb supporting plate 36. The traction attachment 46 is bodily mounted upon the plate 36 through the medium of shaft 47, and the set screw 44 is utilized for rigidly and detachably securing the traction attachment to the

plate 36, as shown. The traction attachment 46 further comprises an upstanding bracket 50, extending at right angles to and above the shaft 47, and including at its lower end a split extension 51, having a square opening 52 formed therethrough and receiving the square shaft 47. A screw-threaded clamping device 53 is provided for releasably clamping the split extension 51 of bracket 50 to the square shaft 47, and by this arrangement, the bracket 50 may be locked in the selected adjusted position upon the shaft 47, after adjustment of the bracket and associated elements lengthwise of the shaft 47 by means to be described.

The traction attachment 46 further embodies a foot supporting plate 54, extending at right angles to and above the shaft 47 and including a heel rest 55 integral therewith. The foot supporting plate 54 is mounted upon and bodily supported by a shaft 56, and detachably fixedly secured thereto by a set screw 57 or the like. The shaft 56 is adjustably received within a bore 58, formed through an upper enlarged head 59 of the bracket 50, which head is provided with an adjustable set screw 60, engageable with the shaft 56 for releasably locking the same in a selected adjusted position relative to the bracket 50. The shaft 56 is parallel to the shaft 47 and spaced above the same, and the shaft 56 is screw-threaded throughout a major portion of its length as shown at 61, for the reception of an adjusting nut 62 arranged upon the side of the bracket 50 remote from the foot supporting plate 54. The shaft 56 may be turned upon its longitudinal axis within the bore 58 and then locked in the selected adjusted position by the set screw 60, for imparting the desired angle to the foot supporting plate 54. The shaft 56 and foot supporting plate 54 are movable lengthwise of the bore 58, prior to tightening the set screw 60 by manipulation of the adjusting nut 62.

The traction attachment 46 further comprises an elongated yoke 63, including spaced parallel sides 64, arranged upon opposite sides of the shaft 47 and receiving between them the lower portion of the bracket 50 adjacent to the shaft 47, FIGURES 6 and 7. At their forward ends, the yoke sides 64 carry inwardly directed spaced transverse extensions 65, integral therewith, and extending adjacent to the forward side of the bracket 50, and notched at 66 for slidably receiving the square shaft 47, as best shown in FIGURES 6 and 8. The opposite end of the yoke 63 carries an integral screw-threaded nut 67, receiving a long adjusting or traction screw 68, provided at its forward end with a ball bearing 69', engaging within a spherical recess 70' in the adjacent end of the shaft 47.

The shaft 47 is immovable relative to the limb supporting plate 36, once the set screw 44 is tightened. Prior to tightening of the screw-threaded clamping device 53, the bracket 50 and associated elements are movable with the yoke 63, lengthwise of the shaft 47. In order to shift the bracket 50 and foot supporting plate 54 away from the limb supporting plate 36 for placing the limb in traction, it is merely necessary to tighten the traction screw 68. When this is done, the yoke 63 moves outwardly upon the screw 68 and is prevented from turning by its guided engagement with the square shaft 47. Movement of the yoke 63 away from the limb supporting plate 36 also causes the bracket 50 and associated elements to move outwardly upon the shaft 47 and away from the limb supporting plate 36, for placing the limb in traction. The clamping device 53 may be tightened to clamp or lock the bracket 50 in the selected adjusted position, longitudinally of the shaft 47.

In conjunction with the traction attachment 46, I prefer to employ a body bracing unit 69, shown particularly in FIGURES 9 and 15-17. The bracing unit 69 steadies the body of the patient lying on the operating table, and resists movement of the body longitudinally when a limb or limbs are placed in traction by the use of the attachment 46. The bracing unit 69 comprises a horizontal V-

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shaped frame including diverging arms 70 of equal length. As shown in FIGURE 15, the rigidly connected arms 70 span one longitudinal edge of the mounting clamp 10 and have their normally free ends detachably connected therewith near opposite ends of the clamp 10. As shown in FIGURE 17, adjacent longitudinal edge portions of the clamp parts 12 and 13 are undercut and beveled at 71. The rigid frame arms 70 are provided at their free ends with heads 72, parallel to the adjacent longitudinal edge of the clamp 10, and carrying lower beveled extensions 73 which underlie the beveled edges 71 of the clamp parts 12 and 13. The heads 72 proper overlie the adjacent edge portions of the clamp parts 12 and 13, and are releasably secured thereto by means of set screws 74, received within screw-threaded openings 75 of the heads 72, FIGURE 17. The clamp parts 12 and 13 are preferably provided upon their upper faces and beneath the heads 72 with shallow longitudinal recesses 76 which receive the lower ends of the set screws 74. When the set screws 74 are tightened, the arms 70 of the V-shaped frame become rigidly secured to the mounting clamp 10, as shown in the drawings.

The bracing unit 69 further comprises an elongated slotted link 77, arranged horizontally and extending longitudinally of the operating table toward the body of the patient. One end of the link 77 overlies the connected ends of the arms 70 and is adjustably secured thereto by a conventional screw-threaded clamping device 78. The link 77 is readily adjustable lengthwise of the operating table and swingable horizontally from side-to-side upon its pivot afforded by the clamping device 78. The clamping device 78, FIGURE 16, engages through the longitudinal slot 79 of the adjustable link 77, as shown.

At its end remote from the mounting clamp 10, the link 77 has an apertured head 80, receiving an upstanding vertical brace bar 81, preferably removably mounted therein. As shown in FIGURE 9, the brace bar 81 is adapted to engage the crotch of the patient on the operating table to resist movement of the body toward the mounting clamp 10, when a limb or limbs of the patient are placed in traction with the attachment 46. The body bracing unit 69 lies substantially flush upon the top of the operating table and causes no obstruction of the other moving parts of the invention, and no interference with the actions of the doctor or his attendants. The entire unit 69 is readily detachable from the clamp 10 by merely loosening the set screws 74, which releases the arms 70 from the clamp 10. The unit 69 need only be used in the invention when the limbs of the patient are placed in traction, or at any time when it is desired to brace the body of the patient against longitudinal movement toward the clamp 10.

Reference is now made to FIGURES 10 through 14, which show the construction and use of a further limb supporting attachment, used in conjunction with the basic limb supporting plate 36 previously described.

In connection with these figures, the numeral 82 designates an auxiliary adjustable limb supporting plate, generally similar to the plate 36 and being somewhat elongated and transversely concave to fit the limb of the patient supported thereon. One end of the plate 82 is downwardly curved or rounded at 83, for a purpose to become apparent, and the plate 82 is provided upon its lower side and at its transverse center and beneath the rounded end portion 83 with a depending longitudinal boss or knuckle 84, apertured at 85. A hinge element 86 is provided, having spaced apertured knuckles 87, adapted to receive the hinge knuckle 84 of plate 82 between them. The hinge element 86 has a pin extension 88 rigid therewith for engagement within the bore 49 of the tubular boss 42 on limb supporting plate 36. The pin extension 88 is rigidly secured within the tubular boss 42 by the tightening of the set screw 44. The auxiliary limb supporting plate 82 is adjustably pivotally secured to the hinge element 86 by a suitable pivot bolt 89, having a conventional screw-threaded clamping nut 90 as-

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sociated therewith for releasably securing the plate 82 in the selected angularly adjusted position relative to the hinge element 86 and the supporting plate 36 carrying the plate 82 and associated elements. The plate 82 is preferably provided near one pair of corners with slots 91 for a strap, not shown, which may be employed to truss the supported limb to the plate 82. The plate 82 is also preferably provided upon its underside and near its end remote from the knuckle 84 with a longitudinal tubular boss 92 for a purpose to be described. The auxiliary supporting plate 82 is readily adjustable angularly with respect to the supporting plate 36 between the extremes shown in FIGURES 11 and 18. The plate 82 may be releasably locked in the selected adjusted positions by means of the screw-threaded clamping device 90. The plate 82 is readily detachable from the plate 36 by merely loosening the set screw 44.

Substantially all of the component parts of my limb supporting attachment for operating tables have now been described in detail, and I now wish to summarize and explain some of the important uses of the device and the positions in which the limbs of the patient may be supported.

With reference to FIGURE 9, both legs of a patient are being supported at desired angles and elevations above the top 11 of the operating table. The leg A of the patient is shown resting upon the basic supporting plate 36 of the adjustable unit 22. The bar 24 of unit 22 is arranged in a relatively low position, and the bar 24 is also at a slight angle to the vertical, and the horizontal bar 34 is relatively close to the top of the operating table. The leg B of the patient is supported by the adjustable unit 23, the bar 24 of which is shown adjusted to a relatively high elevation. The leg B is resting upon the supporting plate 36 of the unit 23, and the leg B is illustrated as being under traction imparted by the attachment 46.

If desired, both legs A and B may be trussed to the supporting plates 36 by straps, not shown, passed through the slots 45 and around the legs A and B. Likewise, the foot C may be strapped or tied to the foot supporting plate 54 by straps not shown, or the foot C may be provided with a special boot of well known construction and readily available on the market and having means to attach the boot to the foot supporting plate 54.

When it is necessary to apply slight traction only to the leg B, such traction may be applied solely by manipulation of the nut 62 and the locking set screw 60. Where long traction is necessary, the nut 62 and associated parts are not utilized, and traction is applied through the use of the adjusting screw 68 and the locking or screw-threaded clamping means 53.

It should be understood in connection with FIGURE 9, that the traction attachment 46 may be employed if necessary in connection with both legs A and B, or with either leg. Likewise, the basic supporting plates 36 may be used alone or without the traction attachment 46 or the auxiliary supporting plate 82. Also, as indicated in FIGURE 1, in some instances it may be desirable to employ only one of the adjustable supporting units 22 or 23, in which case the other limb supporting unit may remain idle or may be placed in a lowered position or even removed entirely from its supporting coupling 26.

With reference to FIGURE 10, the adjustable units 22 and 23 with the basic limb supporting plates 36 are shown in use for supporting both arms D and E of the patient in substantially horizontal extended positions outwardly of the sides of the operating table. The bars 24 are swung downwardly to substantially horizontal positions, and the bars 34 are adjusted longitudinally to extend transversely outwardly of the bars 24. The supporting plates 36 are turned to extend substantially parallel to the transverse bars 34 and the parts are all locked in the selected adjusted positions by the previously described screw-threaded clamping devices. The arms D and E may be strapped to the supporting plates 36 if desired, as previously explained.

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In FIGURE 11, one use of the auxiliary supporting plate 82 is illustrated for supporting one arm of the patient at an elevation somewhat above the operating table and transversely thereof. The adjustable unit 22 in FIGURE 11 is swung downwardly from the vertical to an intermediate position somewhere between the positions shown in FIGURES 1 and 10. The transverse bar 34 extends inwardly and above the operating table and the basic supporting plate 36 is adjusted to extend longitudinally of the bar 34. The auxiliary supporting plate 82 is adjusted to extend substantially longitudinally of the plate 36 or at a slight angle thereto, and the plate 82 is locked in the selected adjusted position by the screw-threaded clamping device 90.

In FIGURE 18, a further use of the main and auxiliary limb supporting plates 36 and 82 is illustrated, for supporting the leg A of the patient in an elevated and bent position, as is necessary, for example, when a cartilage operation is being performed upon the knee. In FIGURE 18, the auxiliary supporting plate 82 is arranged at substantially right angles to the main supporting plate 36, and locked in the selected adjusted position by means of the screw-threaded clamping device 90. The main supporting plate 36 in FIGURE 18 is arranged beneath the thigh of the leg A, at a steep angle to the horizontal, and this position of the supporting plate 36 may be obtained by the use of the adjusting and clamping screw 41.

FIGURE 18 also illustrates one possible use of an additional main supporting plate 36, below the ankle portion of the leg A, in conjunction with the auxiliary supporting plate 82. In a case where the leg A might be fractured at several places below the knee, it may be desirable to support the leg throughout a greater portion of its length than would be possible with the auxiliary supporting plate 82 alone, or in conjunction with the single main supporting plate 36 beneath the thigh of the leg in FIGURE 18. As shown in FIGURE 19, a connecting pin 93 has one end engaging within the tubular boss 92 of the auxiliary supporting plate 82, and its other end is engaged within the tubular boss 42 of the main supporting plate 36 below the ankle portion of the leg A in FIGURE 18. The pin 93 is rigidly and adjustably secured within the tubular boss 42 by the set screw 44 previously described in connection with FIGURE 4. The pin 93 is likewise rigidly and adjustably secured within the tubular boss 92 by a similar set screw 94 provided upon the boss 92, as shown. With this arrangement, FIGURE 18, the additional supporting plate 36 beneath the ankle of the leg A extends longitudinally of the auxiliary supporting plate 82 and forms in effect a rigid continuation thereof. The supporting plate 36 in FIGURE 18 beneath the ankle of the leg A is reversed end-for-end from the positions of the supporting plate 36 previously described in connection with FIGURE 9 and other views of the drawings.

The additional supporting plate 36 beneath the ankle of the leg A in FIGURE 18 may be omitted entirely, in cases where it is unnecessary or undesirable to support the ankle portion of the leg, in which case the knee will still be supported in the same manner shown in FIGURE 18 during a cartilage operation or the like. Additionally, the extra supporting plate 36 shown in FIGURE 18 may be used in conjunction with another and identical supporting plate 36, such as the one shown supporting the leg A in FIGURE 9, or wherever it is necessary to support a longer portion of the patient's limb than one supporting plate alone would be capable of supporting. As a further example, the additional supporting plate 36 beneath the ankle in FIGURE 18 could be used outwardly of and in conjunction with the supporting plate 36 beneath the arm E in FIGURE 10, if desired.

FIGURE 18 also illustrates again the use of the body bracing attachment or unit 69, as would be necessary when the left leg B in FIGURE 18 is held in traction.

In FIGURE 20 of the drawings, there is illustrated a further use of the traction attachment 46 previously de-

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scribed. In some cases, it may be desirable not to support the calf of the leg rearwardly of the foot supporting plate 54 when the leg is in traction. As shown in FIGURE 20, the main limb supporting plate 36 is reversed or turned end-for-end from its position shown in FIGURE 2 and the plate 36 is locked in the selected adjusted position by means of the clamping screw 41. The shaft 47 of the traction attachment is also reversed with the supporting plate 36 in FIGURE 20, and the bracket 50 has been disengaged from the shaft 47 with the foot supporting plate 54 and associated elements and reversed 180 degrees from its position shown in FIGURE 2. This arrangement presents the foot supporting plate 54 properly for supporting engagement with the foot of the patient, while the supporting plate 36 extends forwardly of the foot supporting plate, in an out of the way position.

In the use of the traction attachment shown in FIGURE 20, the foot of the patient is either strapped to the supporting plate 54 or secured thereto with a special boot, not shown, and short traction is applied to the limb in the same manner previously described in connection with FIGURE 2 by manipulating the nut 62. The long traction yoke 63 and the traction screw 68 shown in FIGURE 2 are not used in connection with the attachment of FIGURE 20, and where long traction is required, it is obtained by merely swinging the bar 24 of the L-shaped unit 23 vertically about the axis of the trunnion 21 for a desired amount.

In view of the foregoing description, taken in connection with the several views of the drawings, it should now be apparent to anyone skilled in the art that I have provided a highly versatile limb supporting attachment for standard operating tables, which enables the operating table to serve all of the major purposes of a more complicated fracture table, such as is not readily available in all hospitals or clinics. I have illustrated in the drawings and described a number of uses of my attachment for supporting the limbs of a patient in various positions for surgery, preparation of the limbs for surgery, setting fractures, applying traction to the limbs, administering an anesthetic, or the like. It is impractical and virtually impossible in the drawings to illustrate all possible adjusted positions of the various component parts of the attachment, but from what has been shown and described, it is believed that anyone skilled in the art will be able to fully understand all of the uses which my attachment is adapted to serve in the hospital.

My limb supporting attachment for operating tables is self-contained, and all parts are bodily mounted upon the main mounting clamp 10 which grips the top 11 of the operating table. No alteration whatsoever of the operating table structure is required when the attachment is installed thereon. No parts of the attachment project underneath the patient's body, or otherwise interfere with his comfort or normal position upon the operating table, and the weight of the patient's body is not relied upon to hold or steady the attachment upon the table, as the clamp 10 is entirely adequate for this purpose. The entire attachment is readily removable from the operating table and separable and collapsible to a highly compact condition for shipment and storage. All of the major component parts including the bars 24 and 34 and their associated couplings 26 and 30 are readily separable, if desired.

By the use of the attachment as described herein, it should be apparent that the device eliminates entirely the need for manual labor on the part of a nurse or attendant for supporting the injured limbs of the patient in various positions during surgery, the setting of fractures, preparation of the limbs for surgery and the like, which manual labor as conventionally employed is very tiring for the attendant, and does not always result in the satisfactory positioning of the limbs for the surgeon or doctor. The attachment is extremely sturdy in construction, and capa-

ble of holding the limbs of the patient in exactly the required positions specified by the surgeon or doctor.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A limb supporting attachment comprising a longitudinally extensible clamp adapted to span a table-like support transversely and including parts to grip the opposite longitudinal edges of the support, trunnions carried by the ends of said clamp and projecting outwardly thereof horizontally, coupling members swiveled to said trunnions and adjustably clampingly secured thereto and having sleeve portions extending substantially at right angles to the trunnions, a first pair of elongated bars adjustably clampingly secured within said sleeve portions of the coupling members and movable lengthwise of the sleeve portions, said bars independently swingable in vertical planes with the coupling members upon the axes of said trunnions, second coupling members swiveled to the ends of said bars remote from the trunnions and adjustably clampingly secured thereto and having sleeve portions extending substantially at right angles to said bars and substantially parallel to the axes of said trunnions, a second pair of elongated bars shorter than the bars of the first-named pair adjustably clampingly secured within the sleeve portions of the second coupling members and shiftable lengthwise therein and extending at substantially right angles to the bars of the first-named pair and bodily movable with the bars of the first-named pair when the latter are swung vertically, and limb supporting means adjustably clampingly secured to the bars of the second-named pair and adapted to be secured in selected adjusted positions thereon.

2. A limb supporting attachment comprising a clamp adapted to engage the top of a table-like support for detachably securing the attachment thereto in a selected position, a trunnion secured to one end of the clamp and projecting horizontally beyond one end of the clamp, a first T-shaped coupling member swiveled to the trunnion and adjustably clampingly secured thereto and having a sleeve portion extending substantially at right angles to the trunnion, an elongated bar adjustably clampingly secured within the sleeve portion and movable lengthwise of the sleeve portion and adapted to be clamped in selected longitudinally adjusted positions, said bar swingable in a vertical plane with said coupling upon the axis of said trunnion for a full 360 degrees of rotation, a second T-shaped coupling member clampingly secured to the end of the elongated bar remote from said clamp and including a sleeve portion transversely of the elongated bar, a relatively short bar adjustably clampingly secured within said sleeve portion of the second coupling member and shiftable lengthwise therein and adapted to be clamped in selected adjusted positions and extending substantially at right angles to the elongated bar, and a limb supporting plate adjustably clampingly secured to the relatively short bar and movable lengthwise thereof and being rotatable about the longitudinal axis of the relatively short bar and turnable with respect to such bar to extend either transversely thereof or longitudinally of the relatively short bar and adapted to be clamped in the selected adjusted position.

3. A limb supporting attachment comprising a clamp to span the top of a table-like support transversely thereof and being adjustable and adapted to grip the longitudinal edges of said support, horizontal trunnions carried by the opposite ends of said clamp and projecting outwardly thereof, couplings swiveled to said trunnions for rotation thereon, clamp means to lock the couplings in selected adjusted positions, a first pair of bars longitudinally adjustably mounted within the couplings, clamp means for

locking said bars in selected longitudinally adjusted positions within said couplings, second couplings secured to the ends of said bars remote from the trunnions, a second pair of bars longitudinally adjustably mounted within said second couplings and extending substantially at right angles to the first pair of bars, clamp means to lock the second pair of bars in selected longitudinally adjusted positions within the second couplings, a pair of limb supporting plates for the second pair of bars, and means carrying said supporting plates and adjustably clampingly secured to the second pair of bars, whereby the supporting plates are adjustable longitudinally and circumferentially of the second pair of bars and lockable in selected adjusted positions.

4. A limb supporting attachment comprising an adjustable clamp for mounting the attachment upon a support, a pair of generally L-shaped limb supporting units adjustably secured to the ends of said clamp and swingable in generally vertical planes, means for locking said units in selected angularly adjusted positions, a limb supporting plate adjustably mounted upon each L-shaped unit, each limb supporting plate having socket means formed thereon, a traction attachment associated with one of said supporting plates and including a shaft extension secured within said socket means, the traction attachment being engageable with a limb of the patient and operable to apply traction to the limb, and a brace connected with said clamp and including an upstanding part serving as a stop and engageable with the body of the patient to resist movement of the body when traction is applied to the limb.

5. A limb supporting attachment for operating tables in accordance with claim 4, wherein said brace comprises a horizontal frame detachably secured to said clamp and arranged close to said support, a slotted link adjustably secured to said frame and being horizontal and shiftable longitudinally, and an upstanding abutment element carried by said link for engagement with the crotch of the patient.

6. A limb supporting attachment comprising a mounting clamp for the attachment adapted to grip the top of a table-like support and being horizontal in use, a trunnion secured to one end of the clamp and projecting horizontally outwardly thereof, a coupling including split sleeves clampingly secured to said trunnion, a first bar adjustably held in one split sleeve of said coupling and turnable with the coupling about the horizontal axis of the trunnion, a second coupling including split sleeves secured to the end of the first bar remote from the trunnion, a second bar adjustably mounted within one split sleeve of the second coupling and extending transversely of the first bar, a limb supporting plate associated with the second bar, means pivotally supporting the limb supporting plate and adjustably clampingly securing the same to the second bar so that the limb supporting plate may be adjusted longitudinally and circumferentially of the second bar and may extend longitudinally thereof or at an angle thereto, socket forming means carried by said plate, an extension plate, an element pivotally connected with the extension plate and having an extension engaging within the socket forming means of the limb supporting plate and clamped therein, said extension plate adapted to be positioned longitudinally of the limb supporting plate or at a desired angle thereto for supporting a limb in an extended or flexed position longitudinally or transversely and at a desired elevation, and means to lock the extension plate in selected adjusted positions relative to the limb supporting plate.

7. A limb supporting attachment comprising extensible clamping means engageable with a table-like support for mounting the attachment thereon, a substantially L-shaped limb supporting unit adjustably clampingly secured to said clamping means and extending above the clamping means and being vertically swingable upon the clamping means and adapted to be clamped in selected

angularly adjusted positions, a limb supporting plate adjustably clampingly secured to said L-shaped unit and adapted to support a limb of the patient at a desired elevation and angle above said support, a shaft detachably rigidly secured to said limb supporting plate and extending longitudinally beyond one end thereof, an upstanding bracket slidably engaging said shaft, a yoke connected with said bracket and slidably engaging said shaft and having a screw-threaded part, a traction screw having screw-threaded engagement with said screw-threaded part of the yoke and engaging the end of said shaft and operable to shift the yoke and bracket longitudinally of said shaft, means to lock said bracket in selected longitudinally adjusted positions along said shaft, and adjustable foot supporting means carried by said bracket.

8. A limb supporting attachment for operating tables comprising adjustable clamp means for mounting the attachment upon the top of the operating table, a vertically swingable unit including a horizontal bar clampingly pivotally secured to said clamp means and adapted to be locked in selected adjusted positions, a limb supporting plate adjustably clampingly secured to said bar, socket means carried by said plate, a shaft detachably secured within said socket means, an upstanding bracket movably mounted upon said shaft, means for locking said bracket in selected longitudinally adjusted positions along said shaft, screw-threaded means connected with said bracket and shaft for shifting the bracket bodily lengthwise of the shaft, a second shaft carried by said bracket and spaced from the first-named shaft and being longitudinally adjustable and having a screw-threaded part, means for locking the second-named shaft in the selected longitudinally adjusted position upon said bracket, a nut carried by said screw-threaded part of the second-named shaft for adjusting the second-named shaft longitudinally, and a foot supporting plate mounted upon the second-named shaft and secured thereto and adapted to support a foot of the patient upon the operating table, said supporting plate adapted to support the patient's leg inwardly of his foot.

9. Limb supporting means for operating tables comprising an extensible clamp for engagement with the top of the operating table, a trunnion carried by one end of said clamp, a first coupling adjustably clampingly secured to said trunnion and being rotatable thereon and adapted to be clamped in the selected adjusted position, a first bar

longitudinally and rotatably held within the first coupling, means to clampingly secure the first bar in the selected adjusted position within the first coupling, a second coupling carried by one end of the first bar, a second bar extending substantially at right angles to the first bar and engaging within the second coupling and being longitudinally movable and turnable therein, means for clamping the second bar in the selected adjusted position within the second coupling, a main limb supporting plate associated with the second bar, adjustable clamping means interconnecting the second bar and main supporting plate and permitting the main supporting plate to extend longitudinally of or transversely of the second bar and to turn upon the longitudinal axis of the second bar and operable to lock the main supporting plate in a selected adjusted position, socket means carried by the main supporting plate at one end thereof, an auxiliary limb supporting plate, a hinge element pivotally connected with the auxiliary limb supporting plate, an extension element secured to said hinge element and engageable within the socket means of the main limb supporting plate, means for detachably securing the extension element within the socket forming means, and screw-threaded means for clampingly securing the auxiliary supporting plate to said hinge element in selected angularly adjusted positions.

10. Limb supporting means for operating tables in accordance with claim 9, and socket means carried by the auxiliary limb supporting plate near one end thereof to facilitate attaching thereto a second main limb supporting plate extending longitudinally of the auxiliary limb supporting plate at its end remote from the first-named main limb supporting plate.

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