No. 848,173. PATENTED MAR. 26, 1907.

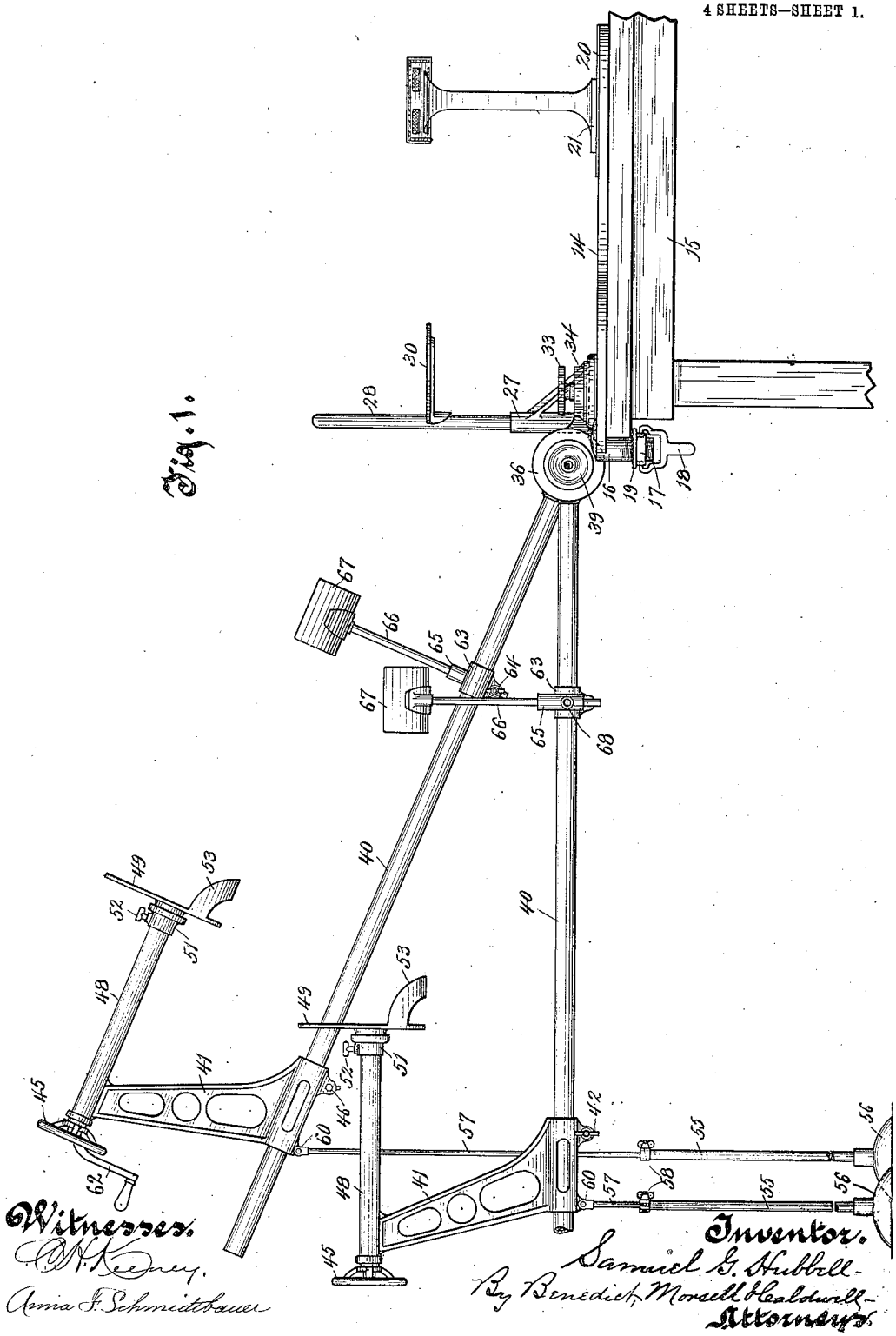
S. G. HUBBELL.

FRACTURE APPARATUS.

APPLICATION FILED APR. 16, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

A. F. Keeney.

Anna F. Schmidtbauer

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4 SHEETS—SHEET 2.

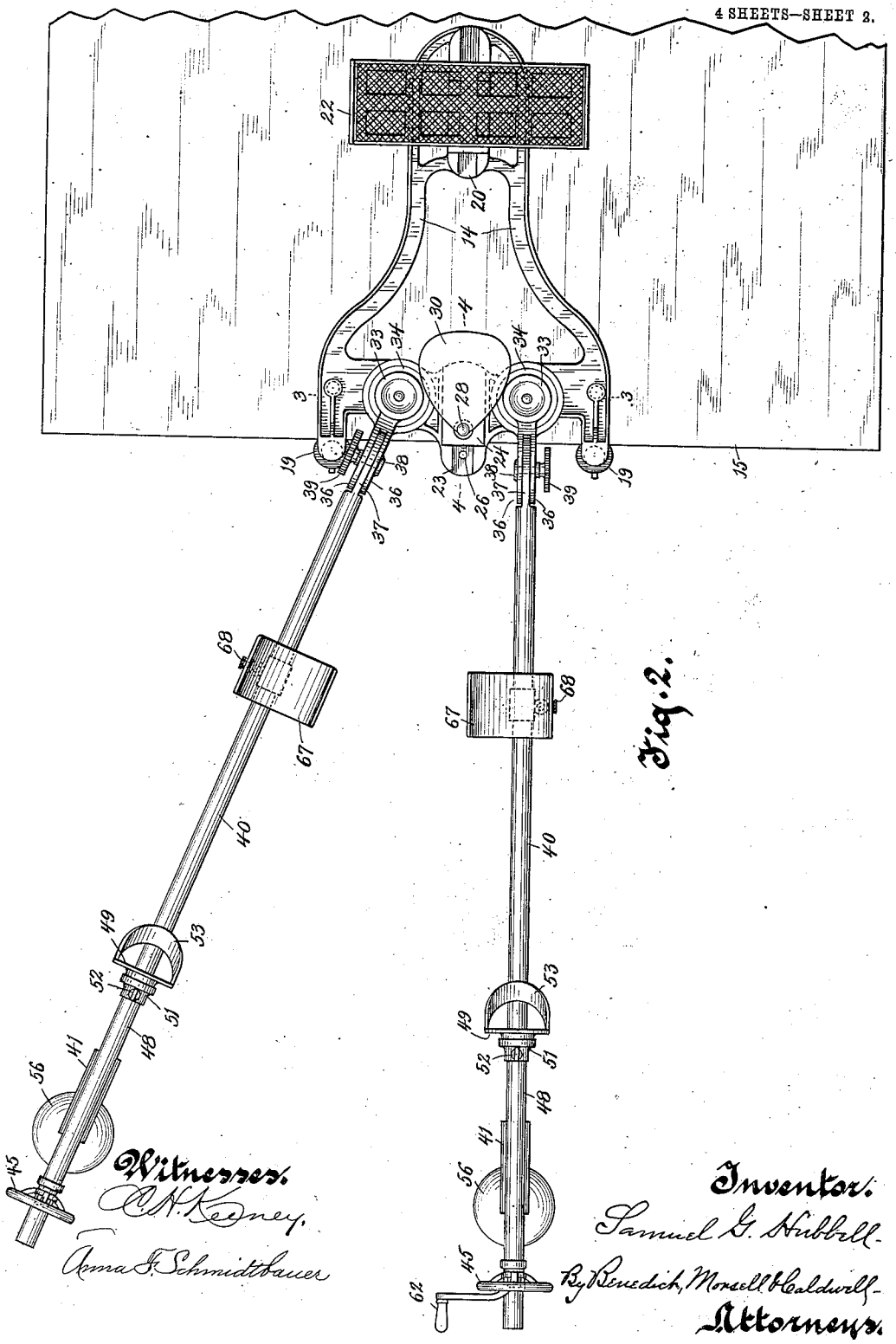

Fig. 2.

Witnesses:
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4 SHEETS—SHEET 3.

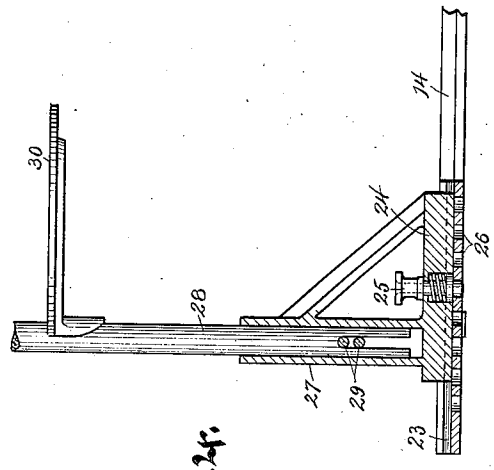

Fig. 4.

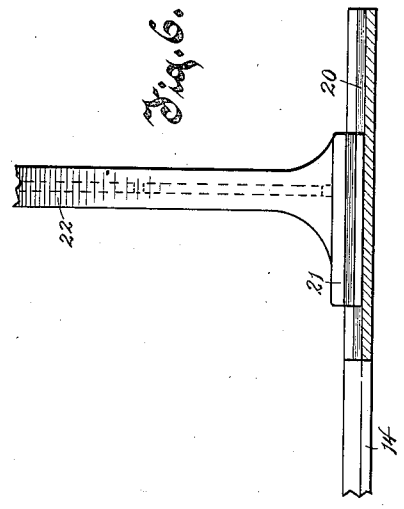

Fig. 6.

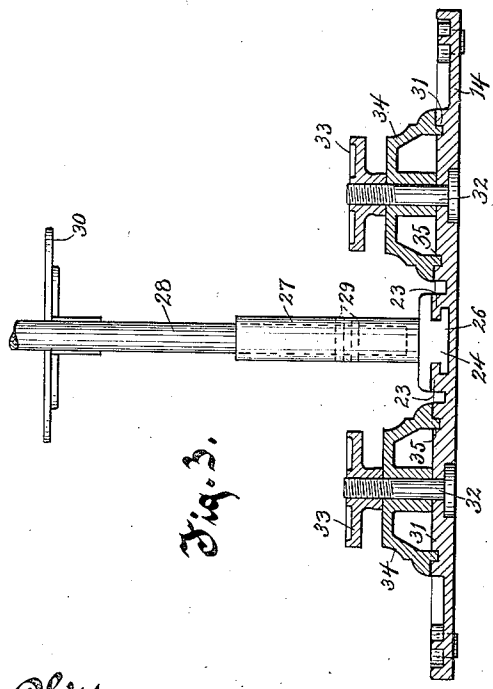

Fig. 3.

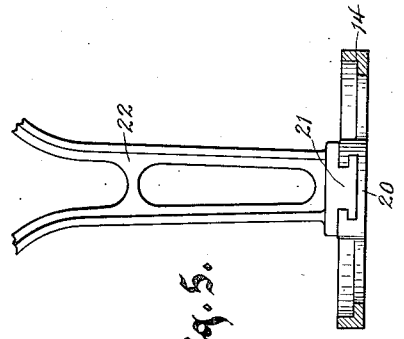

Fig. 5.

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APPLICATION FILED APR. 16, 1906.

4 SHEETS—SHEET 4.

Fig. 10.

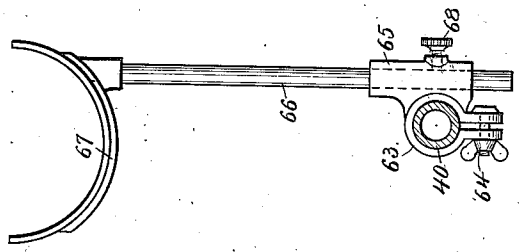
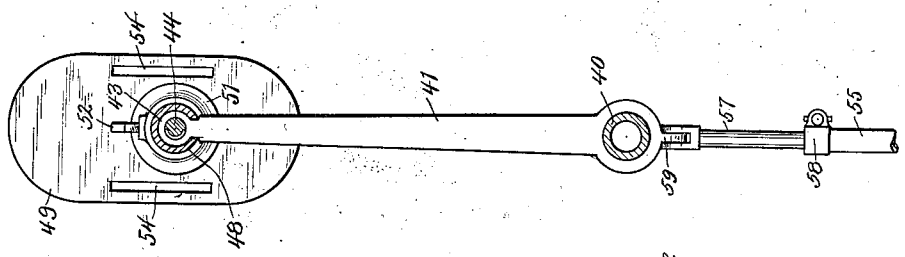


Fig. 8.



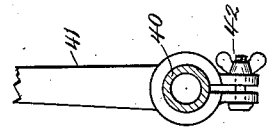


Fig. 9.

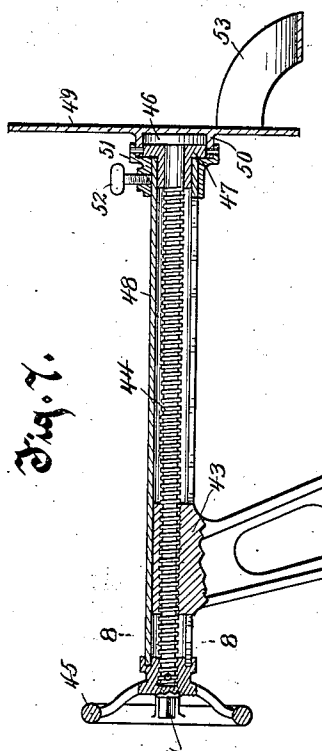
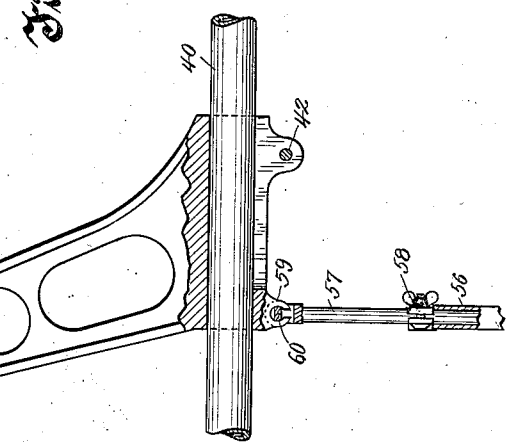


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

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FRACTURE APPARATUS.

No. 848,173. Specification of Letters Patent. Patented March 26, 1907.

Application filed April 16, 1906. Serial No. 311,822.

To all whom it may concern:

Be it known that I, SAMUEL G. HUBBELL, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Fracture Apparatus, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

It is the object of this invention to make extension or flexion of the extremities of the human body, so as to overcome the overriding of fractured or diseased bones caused by the contraction of powerful muscles, in order that permanent fixed dressings may be applied to maintain the fractured or diseased bones in their normal anatomical relation.

To attain the objects of my invention, I have devised a machine or apparatus by means of which the legs of a patient may be fastened to the apparatus and extended or flexed or extended and flexed in any direction at the pleasure of the operator and definite traction made upon the fractured or diseased fragments of bone or bones.

In the accompanying drawings I have shown an apparatus embodying my invention in the best way now known to me; but I contemplate various other applications and also changes in the details of construction of the apparatus, some of which would obviously suggest themselves to a skilled physician or surgeon or to a person versed in the science and art of medicine and surgery.

With the above and other objects in view the invention consists in the apparatus herein described, its parts and combinations of parts, and all equivalents.

Referring to the accompanying drawings, in which like characters of reference indicate the same parts in the several views, Figure 1 is a side elevation of a surgical apparatus embodying the present invention. Fig. 2 is a plan view thereof. Fig. 3 is a transverse sectional view on the plane of line 3 3 of Fig. 2. Fig. 4 is a sectional view on the plane of line 4 4 of Fig. 2. Fig. 5 is a detail view, in end elevation, of the sliding connection for the adjustable shoulder-rest. Fig. 6 is a similar view thereof in side elevation with the guide sectioned. Fig. 7 is a sectional side elevation of one of the foot-supports and its associated parts. Fig. 8 is a sectional end elevation thereof on the plane of line 8 8 of Fig. 7. Fig. 9 is a detail view of the clamping connection for the foot-brackets, and Fig. 10 is a detail view of one of the knee-rests.

In the drawings, 14 represents a frame which is designed to rest upon an ordinary table 15 and to be securely fastened to the edge thereof by means of clamps formed by depending threaded projections 16 at the front end of the frame with nuts 17 threaded thereon and provided with swiveled wrench-handles 18, by which they may be turned to force toothed washers 19 against the under side of the table edge.

The contracted rear end of the frame 15 is provided with a longitudinally-extending grooved guide 20, in which is slidably mounted the flanged base 21 of a shoulder-rest 22, which stands some distance above the top of the table and is capable of longitudinal adjustment by reason of the sliding connection of its base.

At the front end of the frame is a grooved guide 23, within which a flanged base 24 is slidably mounted, there being a spring-bolt 25 on the base to enter openings 26 of the guide for locking the base in various adjustments. The base 24 carries a tubular socket 27 to receive the lower split end of a pelvic-support post 28, the slot in the end thereof fitting over rigid pins 29 in the socket to prevent the post from turning. The pelvic-support post 28 is provided at an intermediate portion with a horizontal rearwardly-extending pubic-support plate 30.

On either side of the guide 23 the frame is provided with a disk-shaped boss 31, through which is passed a bolt 32, having a large knurled nut 33, threaded thereon and bearing upon a cup-shaped member 34 to clamp it to the boss. The cup-shaped member is provided with a downwardly-extending annular flange 35, fitting within a corresponding groove in the surface of the boss 31. The bolts 32 are vertical, so that the movements of the members 34 thereon are in a horizontal plane and each of said members is provided with a pair of vertically-arranged disks 36, with a third disk 37 pivotally mounted between them on a horizontal bolt 38, having a knurled hand-nut 39, so that the intermediate disk 37 is capable of swinging in a vertical plane and may be clamped in its adjustments by the hand-nut 39. The disks 37 form the ends of extension-rods 40, which

are free to be moved in any direction by reason of the universal joint connections with the frame, such joints being afforded by the horizontally-moving connection between the members 34 and the frame and the vertically-moving connection between the disks 36 and 37. The clamping-screws of these joints permit the extension-rods to be locked in their various vertical and lateral adjustments. The extension-rods 40 may be made of straight tubing or rods in one piece or in sections secured together, as desired.

On each of the extension-rods 40 is slidably fitted a foot-bracket 41, whose sleeve or bearing for the extension-rod is partially split with its parts connected by a clamping-screw 42, so that the foot-bracket may be fixed in its longitudinal and radial adjustments on the extension-rod. Each foot-bracket 41 forms an elongated nut 43 at its upper end to receive a screw-spindle 44, which is threaded therein and arranged parallel with the extension-rod. The screw-spindle has a hand-wheel 45, fixed on its front end, by which it may be turned in the nut 43 to feed nearer to or farther from the pelvic post 28. At the other end of the screw-spindle is a flat head 46, against which bears a flanged bushing 47, loosely mounted on an unthreaded portion of the screw-spindle. A tubular sleeve or casing 48 surrounds the screw-spindle with its ends loosely fitting on the flanged bushing 47 and in an annular groove in the hand-wheel 45 and is provided with a slot in its under part through which the foot-bracket 41 passes and is free to travel from one end of the screw-spindle to the other.

A foot-support 49 is provided with an annular flange 50 on one face to surround the head 46 of the screw-spindle and the flange of the bushing 47, and a collar 51, which loosely fits on the end of the tubular casing 48, overlaps said flange and is rigidly secured thereto, there being a set-screw 52 in the collar for engaging the tubular casing and locking the foot-support in its upright position or in any angular position to which it may be turned by reason of its swivel connection with the tubular casing. The foot-support is provided with a projecting heel-rest 53 for supporting the patient's foot and is also provided with slots 54, through which straps or bandages may be passed for securely fastening the patient's foot thereto.

By turning the hand-wheel 45 to the right or left the screw-spindle 44 is fed through the nut 43, so as to cause the foot-support to move toward or away from the pelvic post, the tubular sleeve moving therewith without turning and serving to rigidly hold the foot-support in its adjusted angular position against turning and also preventing the screw-spindle from becoming caught in bandages or other windings and the like during the operation. The hand-wheels 45 are provided with squared projections 61, to which may be fitted a crank-handle 62 for turning the screw-spindle when increased leverage is desired.

In order to support the extension-rods 40 and the weight carried thereby in the exact positions desired, extensible supports are provided, which comprise tubular sections 55, mounted on bases 56, with rod-sections 57 telescoping therewith and pivotally connected to the sleeves of the foot-brackets 41, there being adjustable stops 58 slidably mounted on the rods 57 and clamped thereto for engaging the ends of the sleeve-sections 55 and locking the supports in their extended adjustments. When it is desired to change the elevation of the foot-support, the clamping-screw 39 is loosened and the extension-rod 40 is swung vertically to the desired angle, meanwhile lifting the rod-section 57 from the tubular section 55 of the extensible supports. When the desired position is attained, the clamping-screw 39 is tightened and the stop 58 is adjusted to its new position. Preferably the extension-rod is slightly raised before fixing the position of the stop 58, so as to put the parts under tension and more rigidly bind them against accidental movement. In order that the extensible supports may be readily detached when desired, their pivotal connection with the foot-bracket is made by means of a slotted ear 59 on the sleeve of the foot-bracket and an elongated pin 60 on the forked upper end of the rod-section 57, which is capable of entering said slot only when the extensible support is approximately parallel with the extension-rod 40. After the pin 60 enters the slot it is capable of turning to any position by reason of an enlargement in the slot forming a socket-bearing therefor.

Sleeves 63 are slidable on the extension-rods 40 between the foot-brackets and the universal joints and are capable of radial and longitudinal adjustment thereon with clamping-screws 64 for clamping their split parts against the extension-rods to bind them in their adjustments. Each sleeve 63 is provided with a sleeve 65 at one side thereof and in a plane at right angles thereto, through which is slidably adjustable a stem 66, carrying a U-shaped knee-rest 67, the adjustments of the stem 66 being fixed by means of a set-screw 68.

In the use of this apparatus the patient is positioned thereon in such a manner that the head rests upon a pillow placed upon a box or other elevation on the table, the shoulders lie upon the shoulder-rest 22, and the remainder of the trunk or torso rests upon the pubic-support plate, the vertical post 28 of which is continued upward from the horizontal plate upon which the pelvis is supported the legs extending to the foot-supports, to which each foot is separately fastened.

The apparatus is so designed that when a human being is made to lie upon the pelvic support and shoulder-rest the trunk or torso is held in a straight line, bringing the transverse axis of the human pelvis at a right angle with a line drawn from the center of the forehead or bridge of the nose to the symphysis pubis, or middle of pubic bone, enabling the operator to make accurate measurements of the two legs.

Where traction by means of extension is used, the pelvic-support post presses against the symphysis pubis or pelvic arch at its middle portion, and about this post as a pivotal point extension is made from one foot-support to the other by turning one of the screw-spindles, or, when the patient is in a conscious state one foot-support may be used as a compression side to be pressed upon by the sound leg, lessening the pull or pressure on the pubic bone by the traction or extension made on the other or affected side.

In treating different conditions the extension-rods 40 are required to be in different positions in order to exert traction upon the fractured parts in the proper direction for restoring their normal relation. This is freely accomplished by reason of the adjustable universal-joint connection of the extension-rods which enables them to be moved to any desired angle with relation to each other and with relation to the trunk of the body. It will be seen that by the use of this apparatus the leg or extremity of the human body can be held, adjusted, or carried in any direction desired by the operator or surgeon, rendered necessary by the character of the fracture or deformity and that accurate reposition of fragments of fractured bones may be made and deformities corrected.

When it is desired to secure the patient's foot in any fixed position against torsional movement, the foot-support may be turned on the tubular casing 48 to the desired axial position and locked in its adjustments by tightening the set-screw 52. The knee-rests 67 may also hold the patient's knee in such positions as desired by locking them in the required position and bandaging or strapping the legs thereto.

By the use of this apparatus it is possible not only to bring fractured or diseased bones or fragments of bones into apposition or into their anatomical or normal relation to each other, but that the fractured or diseased bones can be and are held immovable at the will of the operator until fixed or immovable dressings or bandages or splints are applied to the injured or diseased extremity, thereby preventing recurrence of the deformity or misplacement of the fractured bone or bones during the application of the fixed or permanent dressing or bandages or splints or retentive appliance used in the discretion of the operator.

What I claim as my invention is—

1. In a device of the character described, a frame, a pelvic-support post mounted thereon, an extension-rod pivotally connected to the frame, and a forcibly-adjusted foot-support on the extension-rod capable of forcibly moving toward or away from the pelvic-support post.

2. In a device of the character described, a frame, a pelvic-support post mounted thereon, an extension-rod pivotally connected to the frame, a bracket adjustable on the extension-rod, a foot-support mounted on the bracket, and a screw for moving the foot-support toward or away from the pelvic-support post.

3. In a device of the character described, a frame, a pelvic-support post mounted thereon, a pair of extension-rods pivotally connected with the frame, and foot-supports on the extension-rods capable of being fed toward or away from the pelvic-support post.

4. In a device of the character described, a frame, a pelvic-support post mounted thereon, a pair of extension-rods having universal-joint connections with the frame, and foot-supports on the extension-rods adapted to be fed toward or away from the pelvic-support post.

5. In a device of the character described, a frame, means on the frame for holding a human body in position, a pair of extension-rods connected to the frame and capable of movement in vertical and horizontal planes, and foot-supports carried by the extension-rods, one of said foot-supports being capable of forcibly moving toward or away from the frame.

6. In a device of the character described, a frame, a pelvic-support post mounted thereon, a pair of extension-rods pivotally connected with the frame, and foot-supports adjustably mounted on the extension-rods and being capable of forcibly moving toward or away from the pelvic-support post.

7. In a device of the character described, a frame, a pelvic-support post mounted thereon, a pair of extension-rods having universal connection with the frame, foot-brackets adjustably mounted on the extension-rods, a screw-spindle threaded through each foot-bracket, and a foot-support carried by each screw-spindle, said screw-spindles serving to feed the foot-supports toward or away from the pelvic-support post.

8. In a device of the character described, a frame, a pelvic-support post mounted thereon, a pair of extension-rods having universal connection with the frame, foot-brackets adjustably mounted on the extension-rods, screw-spindles threaded in the foot-brackets, a slotted tubular casing surrounding each screw-spindle with the foot-bracket passing through the slot thereof, and a foot-support carried by the screw-spindle adapted to be

forced toward or away from the pelvic-support post by the turning of the screw-spindle.

9. In a device of the character described, a frame, a pelvic-support post mounted thereon, a pair of extension-rods having universal connection with the frame, brackets adjustably mounted on the extension-rods, screw-spindles threaded through the brackets, a slotted tubular casing surrounding each screw-spindle and mounted to move longitudinally therewith, the bracket slidable in the slot thereof preventing rotation of the tubular casing, and a foot-support adjustably swiveled to the tubular casing and adapted to be moved toward or away from the pelvic-support post by the turning of the screw-spindle.

10. In a device of the character described, a frame, a pelvic-support post mounted thereon, a pair of extension-rods having universal connection with the frame, a bracket adjustably mounted on each extension-rod, a headed screw-spindle threaded through the bracket, a hand-wheel on the screw-spindle by which it may be turned, a flanged bushing on the screw-spindle, a slotted tubular casing surrounding the screw-spindle with the bracket passing through the slot, one end of the tubular casing fitting in a groove of the hand-wheel and the other end thereof fitting on the flanged bushing, a foot-support receiving the head of the screw-spindle, a collar on the foot-support fitting on the tubular casing, and a set-screw on the collar engaging the tubular casing for holding the foot-support in its angular adjustments, the foot-support being movable toward or away from the pelvic-support post by the turning of the screw-spindle.

11. In a device of the character described, a frame, a pelvic-support post mounted thereon, extension-rods pivotally connected to the frame, foot-supports on the extension-rods adapted to be forced toward or away from the pelvic-support post, and extensible supports for the extension-rods comprising telescopic sections connected with the foot-supports and provided with means for locking them in their adjustments.

12. In a device of the character described, a frame, a pelvic-support post mounted thereon, extension-rods pivotally connected to the frame, foot-supports mounted on the extension-rods and adapted to be forced toward or away from the pelvic-support post, and extensible supports for the extension-rods comprising telescopic sections pivotally connected with the foot-supports with means for locking them in their adjustments, the pivotal connection between the extensible supports and the foot-supports being of a flat pin-and-slot construction by which the extensible supports may be quickly disconnected when in a position approximately parallel with the extension-rods.

13. In a device of the character described, a frame, a pelvic-support post mounted thereon, a pair of extension-rods having universal connection with the frame, and foot-supports carried by the extension-rods and adapted to be forcibly moved toward or away from the pelvic-support post, the universal connections of the extension-rods comprising cup-shaped members with annular flanges fitting in corresponding seats in the frame with vertical clamping-screws passing through said members and the frame, and pairs of parallel vertical disks on said cup-shaped members with disks on the ends of the extension-rods therebetween and pivotally mounted on horizontal clamping-screws passing therethrough.

14. In a device of the character described, a frame, a pelvic-support post adjustably movable on the frame, extension-rods pivotally connected to the frame, and foot-supports on the extension-rods adapted to be forcibly moved toward or away from the pelvic-support post, the movements of the pelvic-support post on the frame being toward or away from the foot-supports.

15. In a device of the character described, a frame having a grooved guide, a pelvic-support post having a flanged base slidably fitting in the guide of the frame, a spring-pressed bolt on the base of the pelvic-support post adapted to enter openings in the frame for locking the pelvic-support post in its adjustments, said pelvic-support post having a slotted end fitting in a socket of the base with the slot receiving a stationary pin to prevent the post turning, a pubic-support plate carried by the pelvic-support post, extension-rods pivotally connected to the frame, and foot-supports on the extension-rods adapted to be forcibly moved toward or away from the pelvic-support post.

16. In a device of the character described, a frame, a shoulder-rest mounted thereon, a pelvic-support post carried by the frame, extension-rods pivotally connected with the frame, and foot-supports on the extension-rods adapted to be fed toward or away from the pelvic-support post.

17. In a device of the character described, a frame, a shoulder-rest slidable on the frame, a pelvic-support post mounted on the frame, extension-rods pivotally connected with the frame, and foot-supports carried by the extension-rods and adapted to be forcibly moved toward or away from the pelvic-support post.

18. In a device of the character described, a frame adapted to rest on a table and be clamped thereto, a shoulder-rest slidably mounted on the frame, a pelvic-support post adjustably mounted on the frame, extension-rods pivotally connected to the frame, and foot-supports carried by the extension-rods and adapted to be forcibly moved toward or away from the pelvic-support post.

19. In a device of the character described, a frame having means for clamping it on top of a table, an adjustable shoulder-rest slidable on the frame, a pelvic-support post adjustably mounted on the frame, extension-rods having universal connections with the frame on either side of the pelvic-support post, brackets adjustably mounted on the extension-rods, screw-operated foot-supports carried by the brackets, extensible supports for the extension-rods, and adjustable knee-rests adjustably mounted on the extension-rods.

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

SAMUEL G. HUBBELL.

Witnesses:
A. L. MORSELL,
ANNA F. SCHMIDTBAUER.