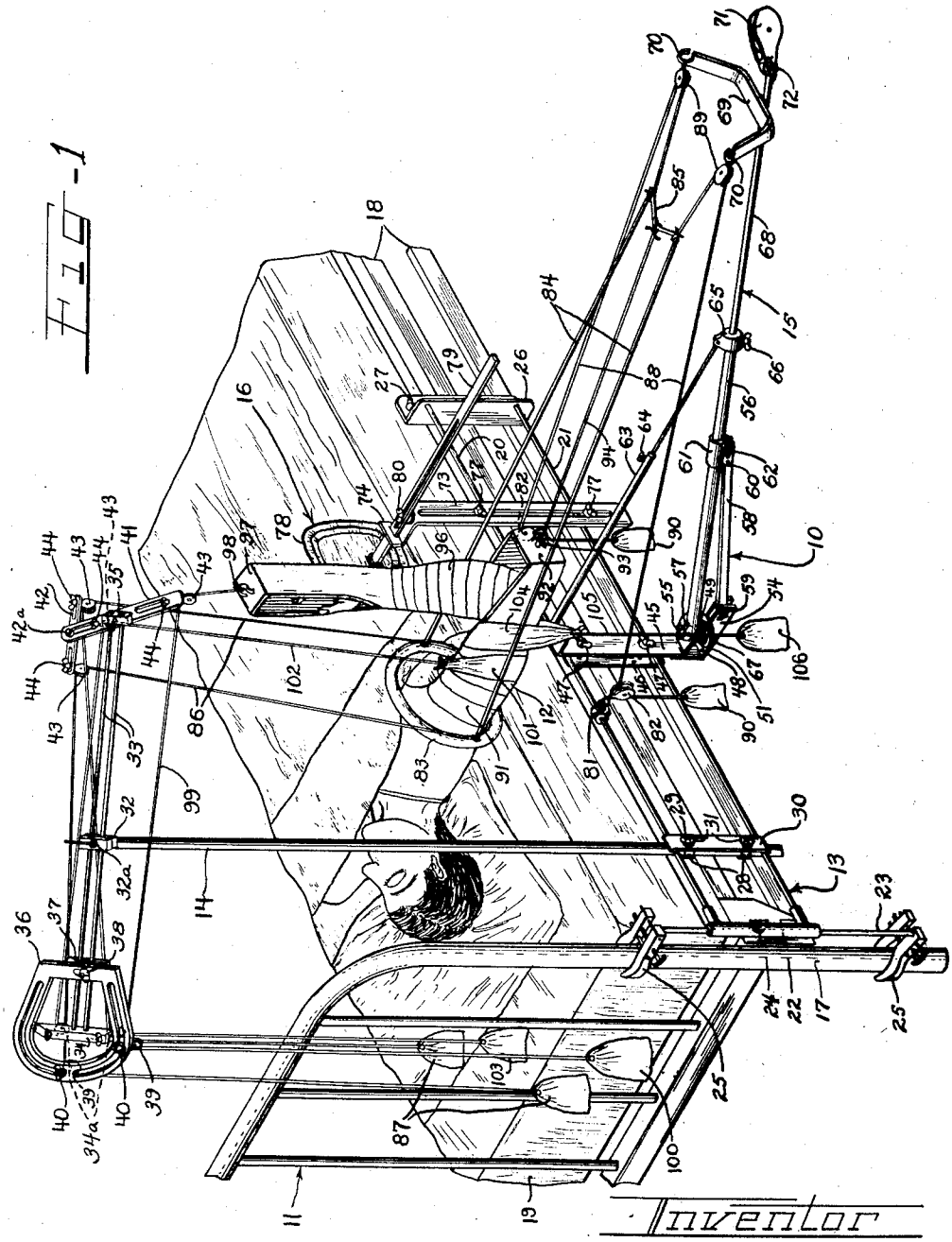
Oct. 6, 1942. D. AU COIN 2,297,861

ADJUSTABLY SUPPORTED SPLINT

Filed Dec. 26, 1939 3 Sheets-Sheet 1

FIG. 1



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ADJUSTABLY SUPPORTED SPLINT

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FIG - 2

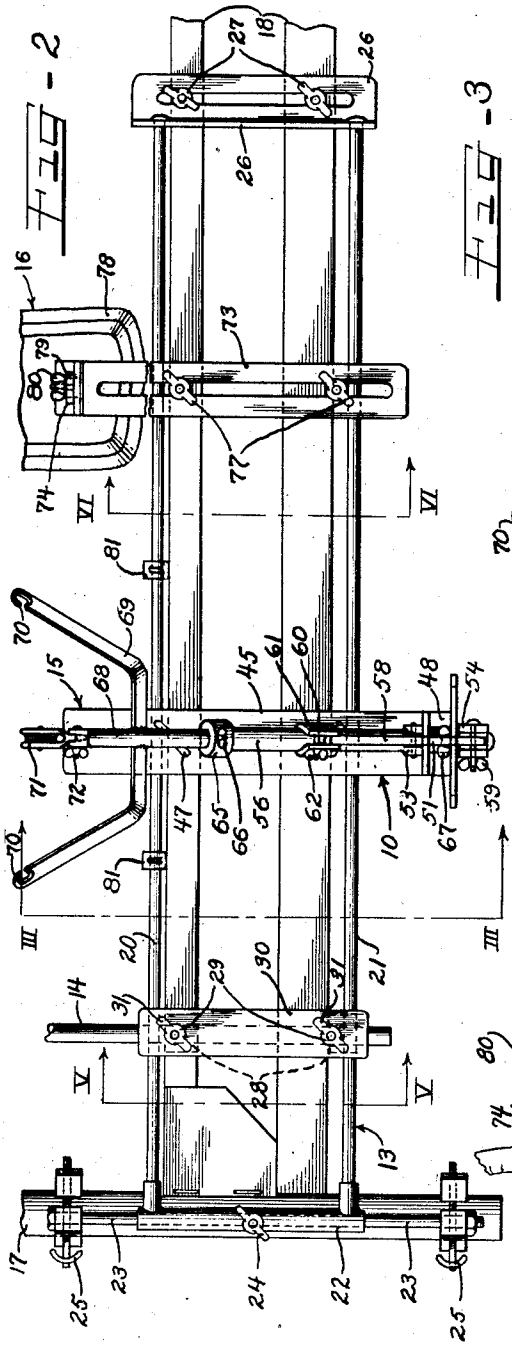
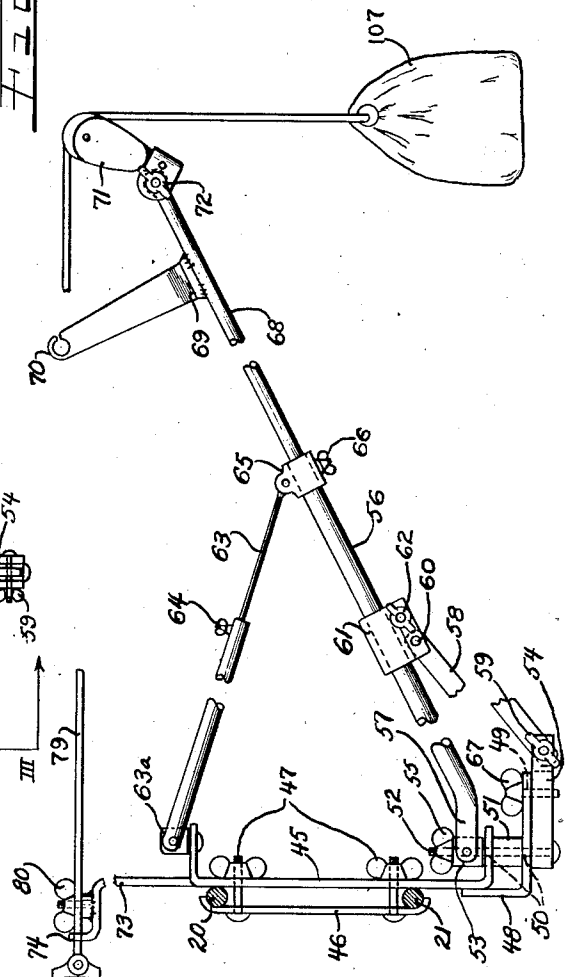


FIG - 3



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ADJUSTABLY SUPPORTED SPLINT

Filed Dec. 26, 1939 3 Sheets-Sheet 3

FIG - 4

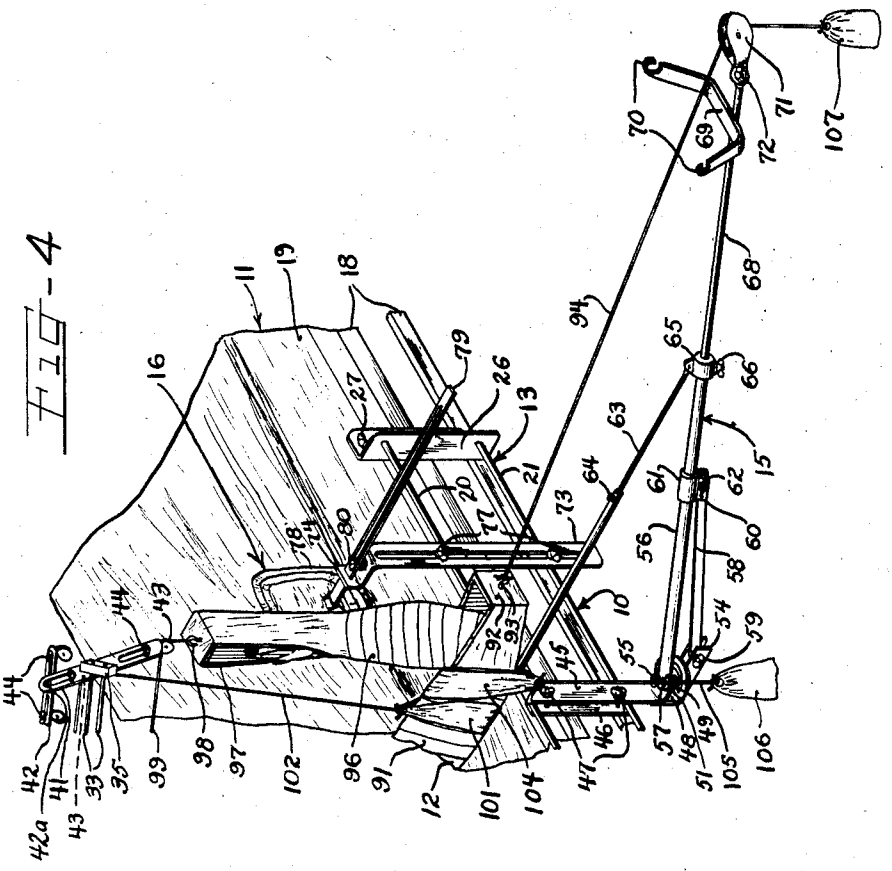


FIG - 5

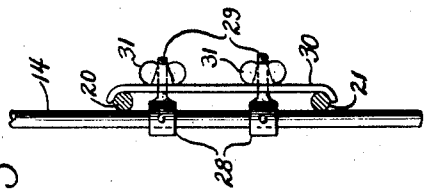
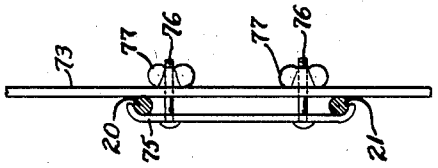


FIG - 6



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Patented Oct. 6, 1942

2,297,861

UNITED STATES PATENT OFFICE

2,297,861

ADJUSTABLY SUPPORTED SPLINT

Didace Au Coin, Chicago, Ill.

Application December 26, 1939, Serial No. 310,955

3 Claims. (Cl. 128—84)

This invention relates to an improved surgical apparatus for use in the reduction and treatment of fractures. More particularly the invention pertains to a completely adjustable apparatus for reducing and treating fractures of the arm which may conveniently be attached to the frame of any standard hospital bed.

A reduction apparatus according to the present invention comprises a base frame attachable at any desired level to a bed. To this base frame there are attached an upright standard for supporting traction means above said bed, an extensible multidirectionally pivotable arm base for supporting traction means beside the bed, and a brace for preventing lateral motion of the body of a patient in response to traction transversely of said bed. The standard, the arm base and the brace can be attached to the base frame at any desired points thereon.

The upright standard is substantially T-shaped. Means are provided for locking the standard to the base frame in any desired position of rotation and with any desired amount of projection above the bed. The crossing member of the T-shaped standard is not only slidable relative to the top of the upright member of the T but is also rotatable around its long axis. The end portions of the crossing member carry devices from which a plurality of pulleys may be suspended in adjustable spatial interrelationship from points spaced from the crossing member. Devices are provided for maintaining the latter and devices carried thereby in any desired positions.

Means are provided for maintaining the arm base in any desired state of extension and in any desired position of pivotion, to thereby support pulleys in adjustable relationship to the base frame. Pulleys adapted to cooperate with those supported from the arm base may also be supported from selected points on the base frame.

The brace may be locked in any desired position of transverse inward projection over the edge of the bed.

The specific traction means to be used in conjunction with the present reduction apparatus comprise cords running over the above mentioned pulleys and variable weights affixed to the free ends of the cords, the other ends being fixed to the point on which traction is to be applied.

The amount of traction may be regulated by varying the magnitude of the pulling weights. The members of the present device being completely adjustable with respect to each other and to the bed, any desired positioning of the pulleys may be realized to thereby effect traction in any desired direction.

This device is further capable of being used in conjunction with devices such as a Thomas splint.

It is therefore an important object of the present invention to provide a surgical apparatus adapted by complete adjustability for use in the reduction of any and all fractures of the arm.

Another important object of this invention is to provide a reduction apparatus comprising a base frame adapted to to be attached to the long side of a bed, means attached to said base frame for supporting traction means above said bed, means also attached to said base frame for supporting traction means beside that bed, and a brace supported from said base frame, all said members being completely adjustable to any desired position and relationship to each other and to the bed.

Other and further objects of this invention will become apparent from the following description and thereto appended drawings and claims.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

In the drawings:

Figure 1 is a perspective view of a reduction apparatus according to this invention as attached to a bed for reduction, in conjunction with a Thomas splint, of a supracondylar fracture of the humerus.

Figure 2 is an enlarged fragmentary side view of the reduction apparatus and part of the bed shown in Figure 1.

Figure 3 is a sectional view, with parts broken away, taken along the line III—III of Figure 2.

Figure 4 is a fragmentary perspective view of the base frame, arm base and brace of Figure 1, as used in the reduction of a supracondylar fracture of the humerus without a Thomas splint.

Figure 5 is a sectional view taken along the line V—V of Figure 2.

Figure 6 is a sectional view taken along the line VI—VI of Figure 2.

As shown on the drawings:

The reference numeral 10 indicates generally a reduction apparatus according to this invention.

In Figure 1 the reduction apparatus 10 is shown attached to a bed 11 for reduction of a supracondylar fracture of the humerus of an arm 12. The reduction apparatus 10 is assembled around an elongated base frame 13, com-

prising additionally a vertical post 14 supporting cross members forming a T therewith. Devices for suspending traction means from said cross members and thus suspended traction means are associated with said cross members. The latter and the therewith associated devices and means are described in detail hereinbelow.

The reduction apparatus 10 further comprises an extensible multidirectionally pivotable arm base 15 supporting traction means described in detail hereinbelow. The reduction apparatus also includes a brace 16.

The conventional bed 11 comprises a head post 17, side rails 18 and a mattress 19.

As shown in Figures 1 and 2, the substantially rectangular base frame 13 extends from the head of the bed 11 along one side thereof and comprises as its long sides an upper rod 20 together with a parallel lower rod 21. The short side of the base frame at the head of the bed is formed by a vertical tube 22 affixed to the ends of the rods 20 and 21. A rod 23 slidable in and longer than the tube 22 is adjustably locked therein by a wingnut 24. Clamps 25 affixed to both ends of the rod 23 engage the post 17 at a selected level to support the head end of the base frame.

The short side of the base frame 13 adjacent the foot of the bed 11 is formed by a vertical angle iron 26 having one longitudinally slotted leg facing the side rails 18 and another therefrom outwardly projecting leg to which the lower ends of the rods 20 and 21 are affixed at right angle. Bolts carrying wingnuts 27 mounted in said slot engage the side rails 18 to support the foot end of the base frame 13 at the selected level.

The base frame 13 is thus adjustable as a unit, the clamps 25 together with the wingnuts 24 and 27 permitting the locking of the base frame at any desired level in relation to the bed 11.

As shown in Figures 1, 2 and 5, the vertical post 14 is adjustably attached to the base frame 13 by means of rings 28 slidably disposed around the post 14 intermediate the rods 20 and 21. The rings 28 carry projecting screws 29 penetrating apertures in a vertical plate 30 whose ends are bent to fit slidably around the rods 20 and 21. Wingnuts 31 on the ends of the screws 29 projecting outside the plates 30 lock the post 14 in any desired position of rotation, with any desired amount of projection above the bed 11 and at any desired distance from the head post 17.

As shown in Figure 1, the crossing members supported by the vertical post 14 to form the T-shaped standard for suspending traction means disclosed hereinabove comprise a tiltable cross piece 32 slidably holding two thereto transversely extending parallel rods 33. The cross piece 32 and the rods 33 may be locked in any desired position by means of a nut 32a.

The rods 33 are joined at one end by a cross piece 34 and at the other end by a relatively shorter cross piece 35. A member 36 shaped like a closed horseshoe is attached to the cross piece 34. A depending apertured portion 37 of the horseshoe-shaped member 36 is penetrated by the rods 33 and locked thereto by a wingnut 38. The horseshoe-shaped member 36 is pierced by two slots extending from the closing segment thereof through the shanks to the middle portion of the curved center of the horseshoe. Pulleys 39 are suspended through the slots of the member 36, being held in any desired position by wingnuts 40. Other pulleys 34a shown in dotted lines are suspended from the cross piece 34.

The means for suspending traction means from the shorter cross piece 35 include a relatively much longer bar 41 slotted longitudinally intermediate its middle and end portions. The bar 41 is rotatable around its point of support and can be locked to the cross piece 35 in any desired position of rotation by means of a wingnut not shown in the drawings. A similarly slotted cross bar 42 is rotatably affixed to the cross bar 41 by means of a bolt 42a penetrating one of the slots in the bar 41. Pulleys 43 suspended from the slots of the cross bars 41 and 42 are locked in any desired position by wingnuts 44.

Any desired positioning of the pulleys 34a, 39 and 43 with respect to each other and to the bed is made possible by the tiltability of the cross piece 32, the slidability of the rods 33 in the cross piece 32, the rotatability of the cross bars 41 and 42, and the adjustability of the pulleys 39 and 43 in the slots of the member 36 and the cross bars 41 and 42, together with the rotatability and adjustability as to level and as to distance from bed post 17 of the post 14.

As shown in Figures 1, 2, 3 and 4, the means for attaching the arm base 15 to the base frame 13 include a strip 45 extending outside the bed 11 vertically across, above and below the rods 20 and 21. The ends of the strip 45 are deflected at right angle away from the bed. A second strip 46 extends vertically behind the rods 20 and 21 with its ends bent slidably around the rods. Bolts and wingnuts 47 hold the two strips 45 and 46 on the bars 20 and 21 at any desired distance from the head post 17.

As best shown in Figure 3, the means for pivotally attaching the arm base 15 to the strip 45 include a strip 48 affixed to the lower vertical end portion of the strip 45. The distal end portion of the strip 48 is deflected at right angle away from the bed. The deflected portion of the strip 48 is wider than the not deflected portion and terminates semi-circularly. A semi-circular slot 49 pierces the deflected portion of the strip 48 adjacently its semi-circular terminal edge. The adjacent horizontal portions of the strips 45 and 48 are pierced by registering holes 50 interconnected by a tubular member 51. A pin 52 threaded at one end and headed at the other end penetrates the holes 50 and the tube 51. Another tubular member 53 is rotatably held by the pin 52 above the horizontal portion of the strip 45. A terminally forked member 54 extending outwardly below the deflected portion of the strip 48 is also rotatably held by the pin 52, the members 45, 48, 51, 52, 53 and 54 being adjustably locked together by a wingnut 55.

As best shown in Figure 3, the arm base 15 comprises a tube 56 having a solid forked deflected end portion pivotally attached to the rotatable tube 53. The middle portion of tube 56 is supported from below by a strut 58. The lower end of the latter is pivotally held between the forks of the member 54 by a bolt and wingnut 59. The other end of the strut 58 is held by a pivot pin 60 between the spaced ends of a strip 61 folded slidably around the tube 56 and adjustably locked thereon by means of a bolt and wingnut 62. The distal end portion of the tube 56 is supported from above by a telescopably extensible member 63 capable of being maintained at any desired length by a wingnut 64. The up-

per end of the member 63 is rotatably and pivotally supported from the upper surface of the upper deflected end of the strip 45 by means of a swivel 63a aligned with the pin 52. The lower end of the member 63 is pivotally attached to a ring 65 slidable on the tube 56. A wingnut 66 locks the ring 65 in any desired position on the tube 56.

The arm base 15 comprising the tube 56 and the supporting members 58 and 63 is erectile as a unit, for all the attached ends of the tube 56 and of the supporting members 58 and 63 are pivotable vertically, and the strip 61 as well as the ring 65 are slidable on the tube 56 while the supporting member 63 is telescopable. The wingnuts 59, 62, 64 and 66 serve to lock the arm base in any desired position of erection. The arm base 15 is also pivotable horizontally as a unit, for the ends of the tube 56 and of the supporting members 58 and 63 are attached, respectively, to the rotatable tubular member 53, the rotatable forked member 54 and the swivel 63, all of which have a common axis of rotation. The wingnut 55 and an additional wingnut and bolt 67 slidably penetrating the slot 49 and fitting intermediate the forks of the member 54 serve to lock the arm base 15 in any desired position of horizontal pivotion around the plates 45 and 48.

The arm base 15 further comprises a rod 68 slidable within the tube 56 and capable of being locked in any desired telescoped relation to the latter by the wingnut 66. The arm base 15 is thus not only adjustably erectile and horizontally pivotable but also adjustably extensible.

The rod 67 supports adjacently its distal end a horizontal transversely extending strip 69 having upwardly deflected end portions terminating in hooks 70. A pulley 71 is pivotally supported by the distal end of the rod 68, where it may be locked in any desired position of pivotion by a wingnut 72.

As shown in Figures 1, 2, 4 and 6, the means for attaching the brace 16 to the base frame 13 include a longitudinally slotted strip 73 extending vertically outside of, across and past the rods 20 and 21. The top end portion 74 of the strip 73 is slotted transversely and offset. A vertical strip 75 extends behind the rods 20 and 21 with its ends bent slidably around said rods. Bolts 76 held by the strip 75 penetrate slidably the longitudinal slot in the strip 73. Wingnuts 77 on the projecting ends of the bolts 76 lock the supporting strip 73 on the rods 20 and 21 at any desired distance from the head post 17 and at any desired level above the bed 11.

The brace 16 comprises a brace proper 78 having a horizontal transversely extending strip 79 slidable in the transverse slot of the offset end portion 74 and capable of being locked in any desired position by a wingnut 80.

The brace 16 being slidable horizontally on the rods 20 and 21 and also vertically adjustable thereon, and the strip 79 together with the brace proper 78 being transversely slidable, the brace 16 can be locked in any desired position relative to the body of the patient.

Rings 81 may be slidably supported and locked in any desired position on the rods 20 and 21. Pulleys 82 may be suspended from such rings.

Figure 1 illustrates the operation of the present device in conjunction with a Thomas splint comprising a ring 83 and therefrom axially extending converging rods 84 whose ends are united by a rod 85 bent toward the ring. The ring 83 is placed around the patient's arm adjacent his body with the rods 84 extending transversely away from the bed. The ring is held at the desired level by cords 86 affixed to the ring at the points of attachment of the rods 83. The cords 86 run over the pulleys 43 and 39 and carry at their other ends weights 87, thus exerting an upward traction on the ring 83. Other cords 88 tied around the junctions of the rods 84 with the rod 85 run over pulleys 89 affixed with cords to the hooks 70 and over pulleys 82, their other ends carrying weights 90. The cords 88 thus exert an outward horizontal traction on the Thomas splint to keep the same in horizontal extension. A bandage 91 wrapped around the upper portion of the upper arm extends past the patient's elbow and holds there a wooden block 92 carrying at its distal end a hook 93. A cord 94 tied around the middle of the bent rod 85 has its other end tied to the hook 93. The traction of the cord 94 also tends to pull the Thomas splint outwardly, a traction which is counteracted by the brace 16.

The weights 87 and 90 may be proportioned to render the traction exerted by the cords 86, 88 and 94 as powerful as may be desired. The direction of traction may be varied by adjusting the relative position of the means disclosed hereinabove supporting the pulleys 39, 43, 82 and 89.

A bandage 96 wrapped around the forearm holds another wooden block 97 having a hook 98 at its distal end. A cord 99 tied to this hook runs over pulleys 34a and 43 and has a weight 100 tied to its other end. The upward traction of the cord 96 holds the forearm erect.

To another bandage 101 tied around the upper arm there is attached a cord 102 running over pulleys 43 and 34a and carrying at its other end a weight 103. The upward traction of the cord 102 lifts the upper arm.

Another bandage 104 wrapped around the distal portion of the upper arm supports a weight 105 by means of a cord 106 which thus tends to lower this end of the upper arm.

Figure 4 illustrates the use of the present device without a Thomas splint. The bandage 91 in this case also holds a block 92 having a hook 93 to which a cord 94 is tied. The latter, however, runs over the pulley 71 and has its other end tied to a weight 107. Other arrangements are identical with those shown in Figure 1.

The hereinabove described reduction apparatus is only one of the many possible embodiments of the principles of this invention. Various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. An adjustably supported splint adapted to be attached to a bed having a head post and side rails, said apparatus comprising an elongated base frame, means for attaching said base frame to said head post and to said side rails at a selected level, a vertical post, means for attaching said post to said base frame in a selected position of rotation, at a selected distance from said head post and with a selected projection above said bed, a crossing member tiltably attached to the top of said post, a second crossing member slidably and transversely attached to said first crossing member, means for locking the top of said post and said two crossing members in a selected relationship, additional crossing members

transversely attached to the ends of said second crossing member, a horseshoe-shaped slotted member attached to one of said additional crossing members, a straight slotted member rotatably attached to the other additional crossing member, means for locking said last two members in a selected relationship, a second straight slotted member rotatably attached to said straight slotted member, means for locking said two straight slotted members in a selected relationship, pulleys suspended from the one of said additional crossing members carrying said horseshoe-shaped member and from all said slotted members, an extensible multidirectionally pivotable arm base, means for attaching said arm base to said base frame at a selected distance from said head post, means for maintaining said arm base in a selected state of extension and in a selected position of pivotion, traction means supported by said arm base, a brace, and means for attaching said brace to said base frame transversely thereto, at a selected distance from said head post and with a selected projection over and above said bed.

2. An adjustably supported splint adapted to be attached to a bed having a head post and side rails, said apparatus comprising an elongated base frame, clamps attached to one end of said base frame and adapted to engage said head post at a selected level, the other end of said frame presenting a vertically slotted surface extending across and facing said side rails, a bolt and nut adapted to hold firmly said surface against said side rails at said selected level, an upright standard, means for attaching said standard to said base frame in a selected position of rotation, at a selected distance from said head post and with a selected projection above said bed, an extensible multidirectionally pivotable arm base, means for attaching said arm base to said base frame at a selected distance from said head post, means for maintaining said arm base in a selected state of extension and in a selected position of pivotion, traction means supported by said arm base, a brace, and means for attaching said brace to said base frame at a selected distance from said head post.

3. An adjustably supported splint adapted to be attached to a bed having a head post and side rails, said apparatus comprising an elongated base frame, means for attaching said base frame to said head post and to said side rails at a selected level, an upright standard, means for attaching said standard to said base frame in a selected position of rotation, at a selected distance from said head post and with a selected projection above said bed, means for exerting vertical traction supported by said standard above said bed, a vertical plate having end portions deflected at right angle, means for attaching said vertical plate to said base frame at a selected distance from said head post with said deflections projecting away from said bed, a second vertical plate aligned with said first plate and having one end portion deflected at right angle, the other end of said second plate being attached to said first deflected plate adjacently the lower deflection thereof, a telescopable arm swivelly attached to the lower deflected end portion of said first deflected plate, a strut having one end swivelly atttached to the deflected portion of said second plate and another end slidably attached to said arm, a telescopable support having one end swivelly attached to the upper deflected end portion of said first plate and another end slidably attached to said arm, means for locking said arm, strut, and support in a selected state of extension and in a selected position of swivelling, traction means supported by said arm, a brace, and means for attaching said brace to said base frame at a selected distance from said head post.

DIDACE AU COIN.