(No Model.)

3 Sheets—Sheet 1.

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INVALID BED APPARATUS.

No. 440,471. Patented Nov. 11, 1890.

Fig. 1.

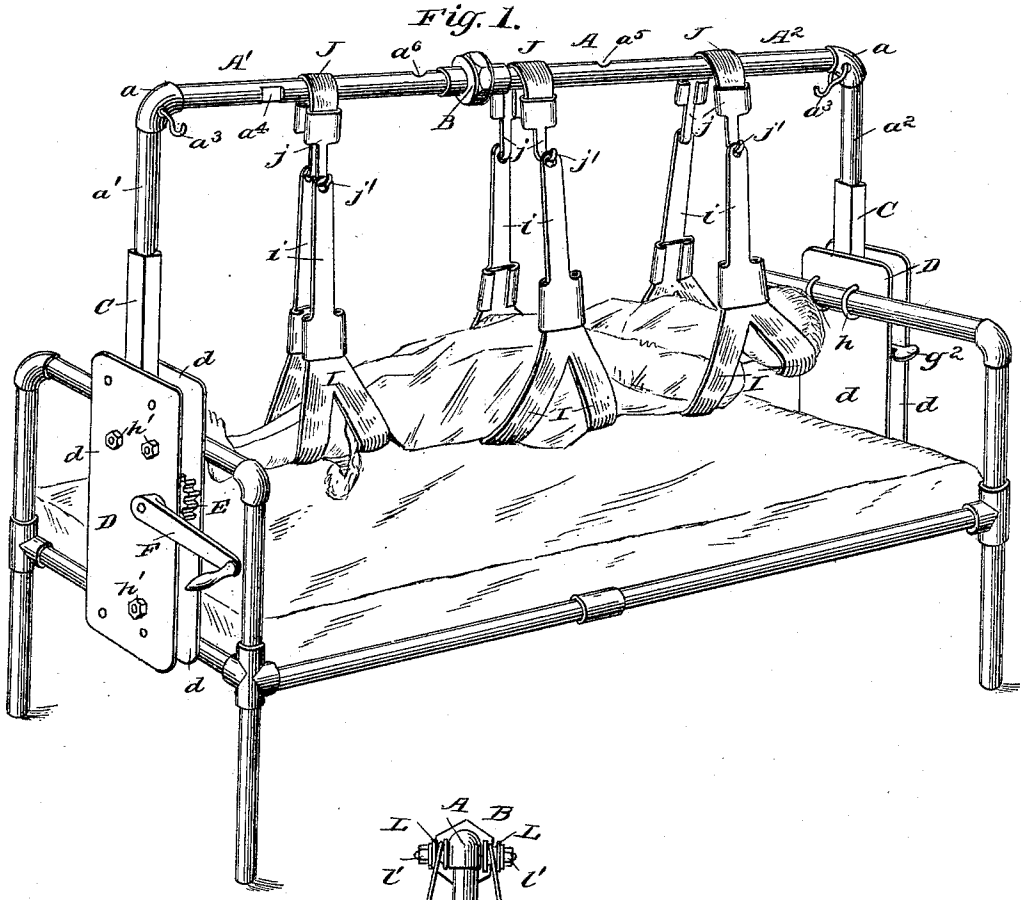
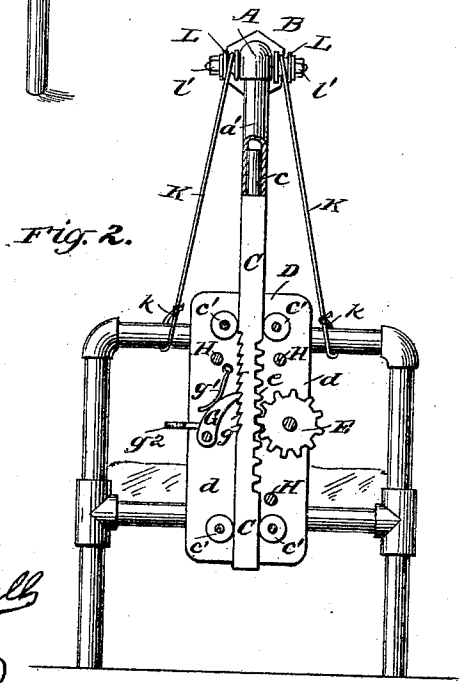


Fig. 2.



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INVALID BED APPARATUS.

No. 440,471. Patented Nov. 11, 1890.

Fig. 3.

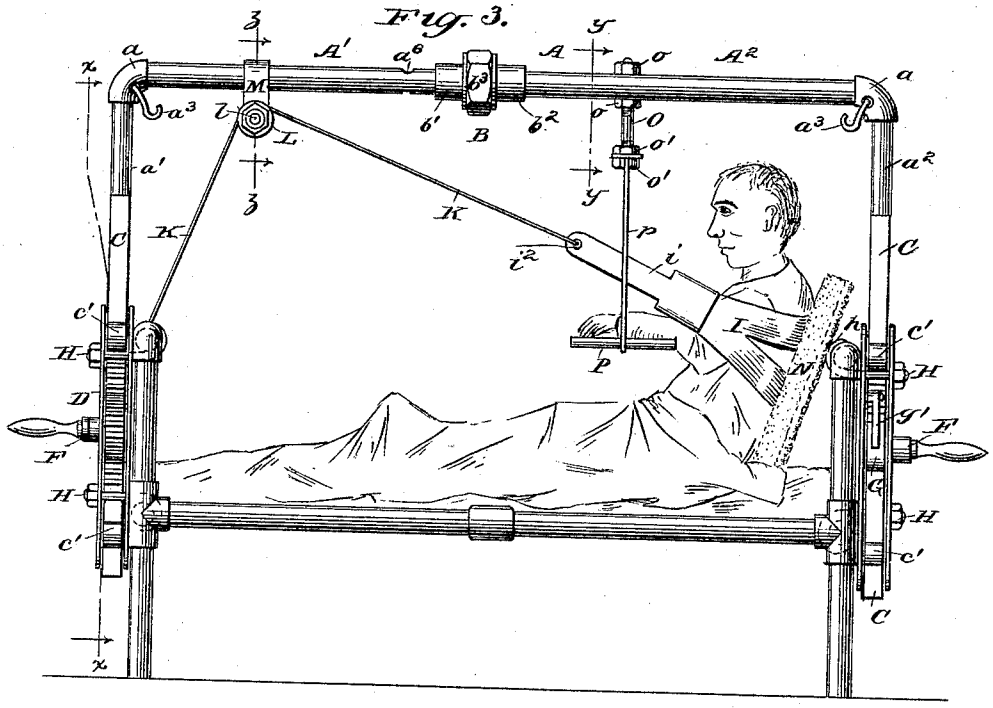


Fig. 4.

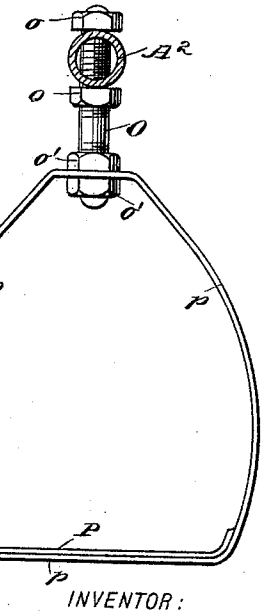


Fig. 5.

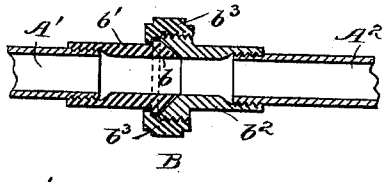


Fig. 6.

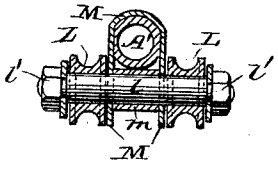
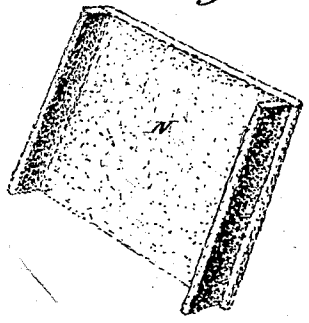


Fig. 7.



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No. 440,471. Patented Nov. 11, 1890.

Fig. 8.

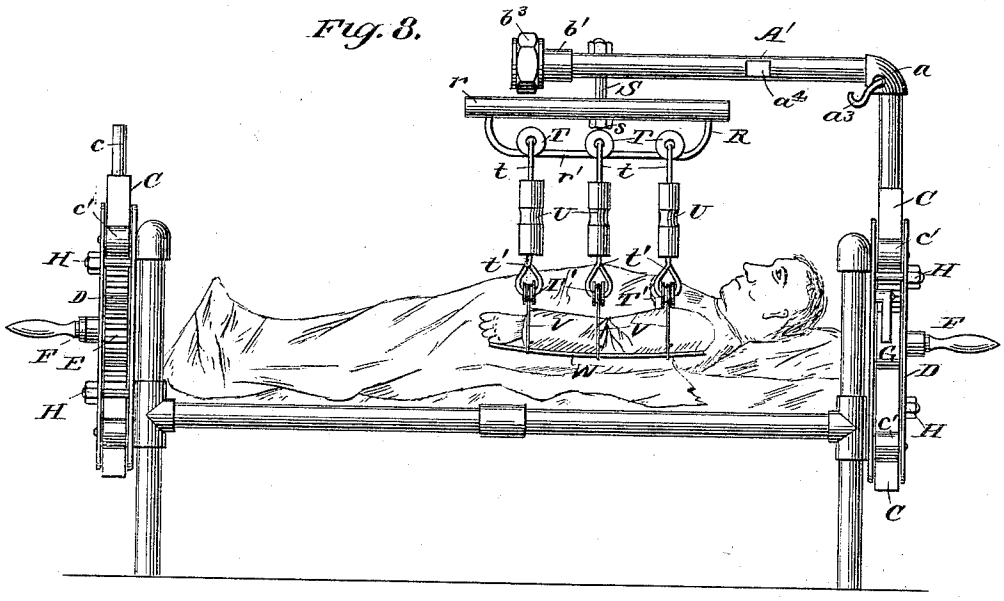


Fig. 9.

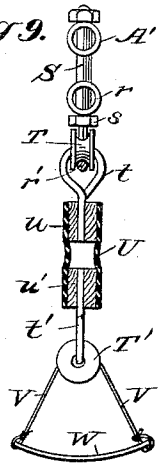


Fig. 10.

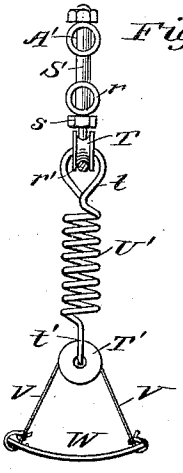


Fig. 11.

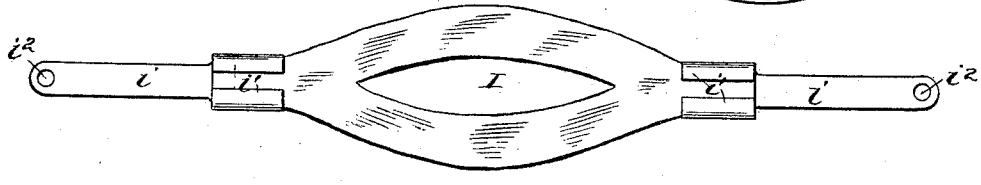
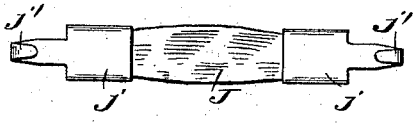


Fig. 12.



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UNITED STATES PATENT OFFICE.

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INVALID-BED APPARATUS.

SPECIFICATION forming part of Letters Patent No. 440,471, dated November 11, 1890.

Application filed June 11, 1890. Serial No. 355,071. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. COLLINS, of Walden, in the county of Orange and State of New York, have invented a new and Improved Invalid-Bed Apparatus, of which the following is a full, clear, and exact description.

My invention relates to an apparatus designed for connection to a bed, and has for its object to facilitate care of the sick or injured by promoting easy and convenient lifting of them to allow change or airing of bedding and to change the position of the patient and provide for convenient service of meals to him and for sustaining a fractured or diseased limb comfortably while allowing every desirable freedom of movement of the patient. The apparatus is more especially adapted for use in hospitals, but may be used anywhere with good results.

The invention consists in certain novel features of construction and combinations of parts of the invalid-bed apparatus, all as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view illustrating my invalid-bed apparatus as applied to use for lifting a patient bodily above the bedding to allow it to be changed or aired. Fig. 2 is an end view of the bed and apparatus with parts in vertical section on the line $x\ x$ in Fig. 3 and a part broken away and illustrates adjustment of draw-cords for raising the patient into a sitting posture. Fig. 3 is a side view of the bed and apparatus with the patient raised into a sitting posture and a back-rest behind him. Fig. 4 is a front or rear view of the dining-table of the apparatus with the suspension-bar in section on the line $y\ y$ in Fig. 3. Fig. 5 is a longitudinal section of the suspension-bar at its union joint or coupling. Fig. 6 is a detail vertical section through the suspension-bar and draw-cord pulleys, taken on the line $z\ z$ in Fig. 3. Fig. 7 is a front perspective view of the back-rest of the apparatus. Fig. 8 represents the apparatus as applied to use for sustaining a fractured or injured limb while the patient rests in bed. Fig. 9 is a vertical sectional end view of the limb-supporter of the apparatus. Fig. 10 is a view of a modification thereof. Fig. 11 is a plan view of the main portion of one of the body-suspending straps, and Fig. 12 is a plan view of the upper hooked part of the suspending-strap.

I will first describe the construction of the sectional suspension-bar and the mechanism holding it to the bed-frame and for vertically adjusting it, as the condition of the patient may require.

The suspension-bar A is preferably made in two parts or sections A′ A^2, which at their upper horizontal portions are connected detachably by a union-coupling B, and at their down-bent vertical end parts a' a^2 are adapted to fit loosely upon pins c, which rise from the upper ends of upright slides C, one of which is arranged for vertical movement in a frame or casing D, held to each end of the bed-frame. The two end slides C C and their casings D D are made alike. Hence a description of one slide and casing and the operating mechanism in the casing for vertically adjusting the slide and the suspension-bar which it supports will suffice.

The slide C is preferably made rectangular in cross-section below its round top pin c to make it fit nicely but loosely between the two opposite face-plates d d of the casing D and between two pairs of guide-rollers c' c', arranged one pair at or near each end of the casing, all the rollers being journaled on axle-pins, which also stay the casing face-plates at proper distance apart. At one side or edge the slide has a toothed rack e, which is engaged by a pinion or gear-wheel E, journaled in the casing and provided on its shaft with a crank-handle F, by turning which the slide may be raised or lowered at will. The slide also has a series of ratchet-teeth g, any one of which may be engaged by a pawl G, pressed toward the rack by a spring g', held in the casing. The pawl has a finger-piece or pin g^2, which projects beyond the edge of the casing to allow convenient disengagement of the pawl from the rack.

The two casings D may be held to opposite ends of the bed-frame in any approved manner. I show them attached by means of hook-

bolts H, the hooks h of which engage the bed-frame bars, to which the casings are drawn tightly by the bolt-nuts h' at the outer faces of the casings. I show three hook-bolts H in each casing. (See Figs. 1, 2, and 3 of the drawings.) I consider these hook-bolts desirable for attaching the casings and their slides and operating mechanism to the tubular metal frame of an ordinary hospital cot-bed; but the casings may be held to the frame of any ordinary wooden bedstead by screws or otherwise to allow operation of the apparatus in substantially the same manner.

The two sections A' A^2 of the suspension-bar A are preferably made of metal tubes having an elbow-fitting a at the corner, and to each of these fittings I may attach a hook a^3 to allow a hammock to be swung between the hooks at any time desired. The coupling B, by which the adjacent ends of the two suspension-bar sections are connected, is of ordinary form and comprises one end piece or tube b', held to the section A' and provided with a shoulder b, against which draws a nut b^3, which is threaded upon the outer end of the other end piece or tube b^2, which is held to the other bar-section A^2, as most clearly shown in Fig. 5 of the drawings.

To allow use of the apparatus to lift a patient bodily from the bedding, I employ a series of sling straps or bands, each made, preferably, in two parts I J. (Shown in Figs. 11 and 12 of the drawings.) The main lower part I of the sling-strap is preferably made widest at the center and cut out at the inside portion, and at each end is provided with a comparatively long sheet-metal tab i, which at its inner end is provided with a pair of clips i' i', which clamp the end of the strap, and at its outer end has a hole i^2. The upper smaller part J of the sling-strap is comparatively short, and at its opposite ends is provided with clip-fastened metal tabs j j, which have end hooks j' j', adapted to hook into the holes or eyes i^2 at the ends of the tabs i i of the other or main part I of the sling-strap. In using this sling device the long thin tabs i at one end of the three straps I will first be slid under the patient, which may easily be done, and after these straps are drawn through until their widest center parts lie directly under the patient their end tabs i will be lifted and hooked onto the the end tabs j of the upper straps J, which are thrown over the suspension-bar A when it is in its lowermost position. If, now, the cranks F F at the end casings D D are turned in proper direction toward the right hand, the slides C C and the suspension-bar A will be lifted and will lift the patient bodily from the bedding, as shown in Fig. 1 of the drawings, to allow change of bed-clothing or airing of the bed, as circumstances may require.

To lift the patient into a sitting posture, I have provided a couple of cords or ropes K K, which are then attached at one end at k k to the foot of the bed-frame, and are passed over guide-pulleys L L, held to a yoke or saddle M, hung upon the suspension-bar A, and thence to opposite end tabs i of one of the sling-straps I, which is slipped or passed under the patient's shoulders as he lies in the bed, the bar A then being in its lowermost position. The forward ends of the cords K may be connected to the ends of the strap-tabs i in any approved manner, as by tying or hooking them thereto. If, now, the suspension-bar A be raised by turning the cranks F, the pulleys L will be raised with it, and as the ends k of the cords K are fastened to the foot of the bed-frame the other ends of the cords will be drawn rearward and will draw on the sling-strap I to raise the patient into a sitting posture, whereupon a back-rest N may be set behind him to support him in comfortable position, as shown in Fig. 3 of the drawings. This back-rest (shown also in Fig. 7 of the drawings) is preferably covered by some suitable soft fabric, and may be cushioned in any suitable manner. When the patient is thus supported in a sitting posture, the cords K and strap I may be removed.

The guide-pulley-supporting yoke or saddle M is shown most clearly in Figs. 3 and 6 of the drawings, and consists of a metal plate which is arched at the top to fit the top rounded surface of the suspension-bar A, and has flat and parallel opposite side parts which fit into notches or grooves a^4, made in opposite sides of the bar, and shown clearly in Figs. 1 and 8 of the drawings. Below the suspension-bar a short washer-tube m is placed between the opposite sides of the yoke and the shaft or axle l, onto which the guide-pulleys L L are journaled, is passed through the yoke and the tube m, and receives nuts l' l' at opposite ends outside the pulleys. Washers are shown between the nuts and pulleys in Fig. 6 of the drawings. The entrance of the yoke M into the side recesses a^4 of the suspension-bar prevents the yoke and pulleys from turning around or twisting out of line beneath the bar.

From a screw-bolt O, which is passed through a hole a^5 in the section A^2 of the suspension-bar A and is held by set or jam nuts o o, one above and the other below the bar, is suspended by its bail p a table or tray P, which is held steadily to the bolt by two jam-nuts o' o', one above and the other below the top of the bail through which the bolt O passes. This tray or table is held in proper position to allow the patient while in a sitting posture to eat his meals comfortably off of it, as will be understood from Fig. 3 of the drawings. The table may also be used as a book-rest or for a flower-stand or for any other purpose.

Figs. 8, 9, and 10 of the drawings illustrate the adaptation of the apparatus for supporting a fractured arm. In this arrangement the suspension-bar sections A' A^2 will be removed from their slide-bearing pins c to allow the section A' to be set upon the pin c of the slide C at the head of the bed and to

which the somewhat longer bar-section A^2 is usually fitted, and when the section A′ is thus adjusted the yoke or saddle M and pulleys L will be removed from it, and a hanger R will be suspended from the section by a bolt S, which fits loosely within a hole a^6, made in the section. The main bar r of the hanger R also fits loosely upon the bolt S while resting on its head s, whereby the entire hanger is free to swing around in horizontal plane on the bolt, and may also rock more or less on the bolt-head. The hanger comprises the bar r, which is preferably tubular, and a lower rail or track bar r', having upturned ends which are secured to the bar r. Upon the hanger-rail r' is placed a series of pulleys or sheaves T, which are preferably journaled upon eyes or loops t, the stems of which, as shown in Figs. 8 and 9 of the drawings, are secured in plugs u, which are fastened into the upper ends of short rubber tubes U, also having plugs u' at their lower ends, into which are fitted the stems of a series of lower loops or eyes t', onto which is placed a series of lower pulleys or sheaves T′, which are journaled in planes at right angles with the upper pulleys T. Over these lower pulleys T′ are passed the middle parts of cords V, the opposite ends of which are connected to opposite sides of a plate W, which forms a rest for the broken arm of the patient. Instead of using the rubber connections U between the opposite pulley-journal loops or eyes $t\,t'$, I may form these right-angularly-disposed loops on the opposite ends of a spiral spring U′, as shown in Fig. 10 of the drawings, either construction giving necessary elasticity or freedom of a vertical movement to the limb plate or rest W. With this construction it is obvious that the suspension-bar section A′ is free to swing or turn horizontally on the pin c of the slide C, and may also be bodily lifted to any desired height by turning the crank F. The hanger R is also free to swing horizontally on the suspension-bar bolt S, and while the limb plate or rest W is free to move forward and backward as the upper pulleys T roll along the rail r' of the hanger R, the limb-plate may also be tilted laterally either way as the cords V slip over the lower pulleys T′ or said pulleys turn on their journals t'. It will thus appear that the utmost freedom of adjustment is allowed the rest W to allow the limb to be comfortably placed within it and provide for any subsequent change of position of the patient, whether lying down or in a sitting posture, and all without removing the limb from its support, which may be said to have a universal motion or adjustment to accommodate every requirement of the patient until a support for the limb is no longer necessary.

While the limb-rest is shown supporting the patient's arm, it may be used with a suitably-formed rest-plate W to sustain a fractured or diseased leg with equal advantages as regards universal movement to accommodate every change of position of the patient, as will readily be understood.

It will be noticed that the slides C, which are geared with lifting and lowering mechanism in the casings D, are practically parts of the upright end portions of the suspension-bar A, and may be so considered in so far as some operative features of the invention are concerned.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In invalid-bed apparatus, the combination of a longitudinal suspension-bar made in detachable sections coupled together, casings adapted for connection with a bed-frame, slides in the casings provided with rounded upper ends, to which the ends of the suspension-bar are detachably held and allowing one or both of its sections to swing in horizontal plane, and gearing, substantially as specified, for vertically moving the slides and holding them at any desired height, substantially as described.

2. In invalid-bed apparatus, the combination, with casings adapted to be held to a bed-frame, slides in the casings, and gearing in the casings for vertically adjusting and holding the slides, of a suspension-bar sustained by the slides and made in two sections connected by a union-coupling, substantially as described.

3. In invalid-bed apparatus, the combination, with casings adapted to be held to a bed-frame, slides in the casings having rounded upper ends, and gearing in the casings for vertically adjusting and holding the slides, of a suspension-bar sustained by the rounded upper ends of the slides and made in two sections connected by a union-coupling, substantially as described.

4. In invalid-bed apparatus, the combination, with casings adapted to be held to the head and foot portions of a bed-frame, of slides guided in the casings and provided with toothed racks and ratchet-teeth, gear-wheels engaging the toothed racks, pawls engaging the ratchet-teeth, and a suspension-bar held to the slides, substantially as described.

5. In invalid-bed apparatus, the combination, with casings adapted to be held to the head and foot portions of a bed-frame, of slides guided in the casings and provided with toothed racks and ratchet-teeth, gear-wheels engaging the toothed racks, pawls engaging the ratchet-teeth, and a suspension-bar held to the slides and made in two sections, one sustained by each slide and both sections connected by a union-coupling, substantially as described.

6. In invalid-bed apparatus, the combination, with casings adapted to be held to the head and foot portions of a bed-frame, of slides guided in the casings and having rounded upper ends and provided at their lower ends with toothed racks and ratchet-teeth,

gear-wheels engaging the toothed racks, pawls engaging the ratchet-teeth, and a suspension-bar made in two sections, one sustained by the rounded upper end of each slide and both sections connected by a union-coupling, substantially as described.

7. In invalid-bed apparatus, the combination, with a vertically-adjustable suspension-bar adapted to be held to a bed-frame and provided with notches a^4, of a saddle M, held in said notches and provided with guide-pulleys L L, cords K K, attachable at one end to a bed-frame, and a back strap or support to which the other ends of the cords are connected, substantially as described.

8. In invalid-bed apparatus, the combination, with a suspension-bar adapted to be held to a bed-frame, of a limb-rest device comprising a hanger suspended from the bar and having a track-rail, upper pulleys on said rail, vertically-yielding elastic connections to said pulleys, lower pulleys journaled to said connections and at right angles to the journals of the upper pulleys, cords running over the lower pulleys, and a limb rest or plate connected to opposite ends of the cords, substantially as described.

9. In invalid-bed apparatus, the combination, with a suspension-bar adapted to be held to a bed-frame, of a pivot-bolt S in the bar, a hanger R on said bolt, upper pulleys T on the hanger-rail r', vertically-yielding elastic connections pendent from said pulleys, lower pulleys T′, journaled to said connections and at right angles to the pulleys T, cords V on the pulleys T′, and a limb-rest plate W, connected to opposite ends of the cords, substantially as described.

10. In invalid-bed apparatus, the combination, with a casing adapted to be held to a bed-frame, a slide movable in the casing, an overhead suspension-bar held to the slide, and mechanism, substantially as specified, for vertically adjusting and holding the slide, of a pivot-bolt S in the bar, a hanger R on said bolt, upper pulleys T on the hanger-rail r', vertically-yielding elastic connections pendent from said pulleys, lower pulleys T′, journaled to said connections and at right angles to the pulleys T, cords V on the pulleys T′, and a limb-rest plate W, connected to opposite ends of the cords, substantially as described.

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