Dec. 8, 1925. **1,564,596**

H. LO GRASSO

ORTHOPEDIC BED

Filed Aug. 7, 1922 3 Sheets-Sheet 1

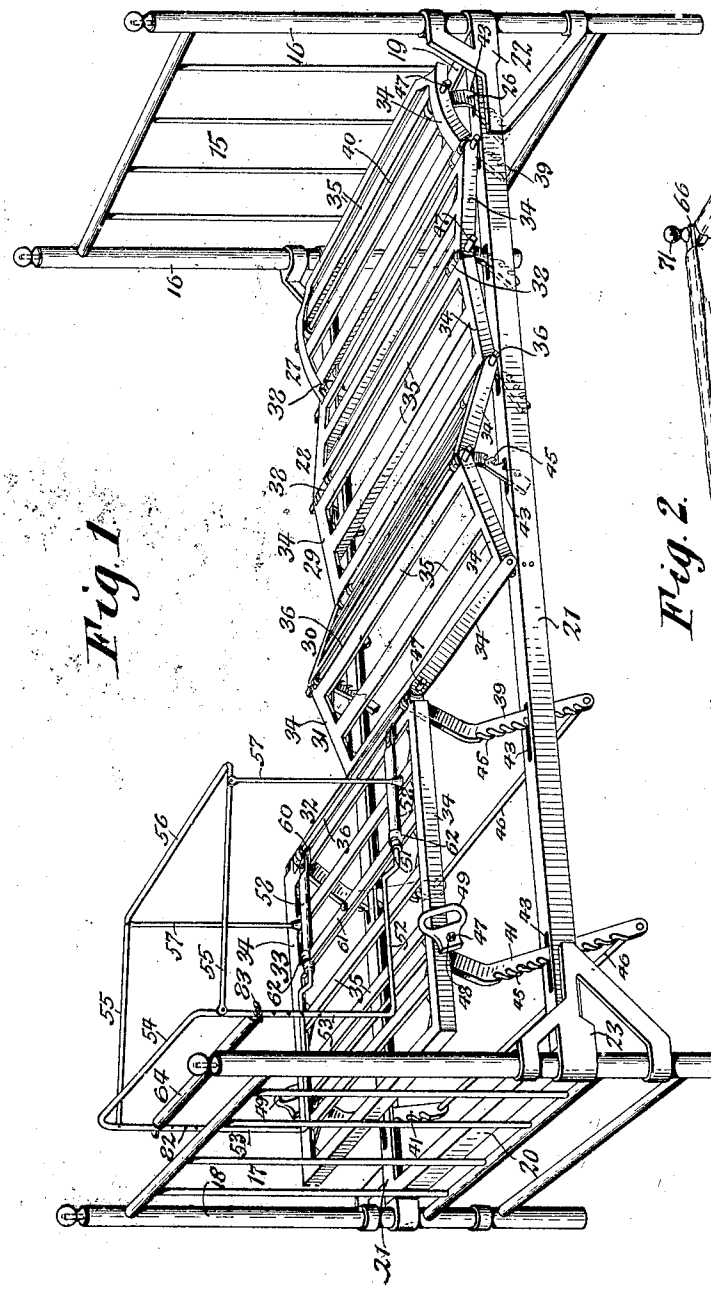


Fig. 1

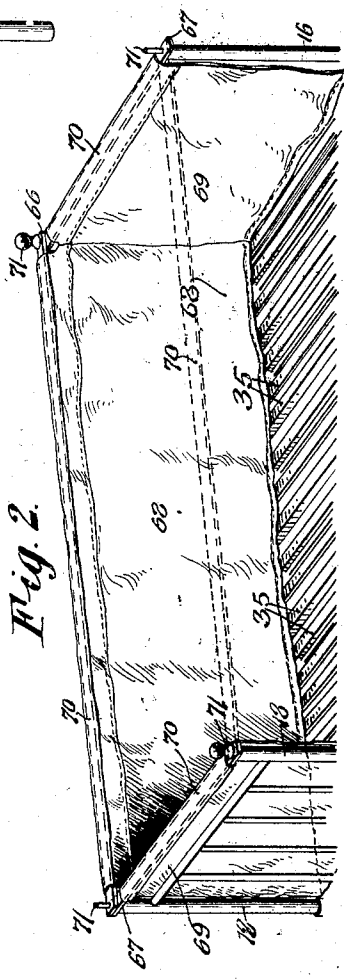


Fig. 2

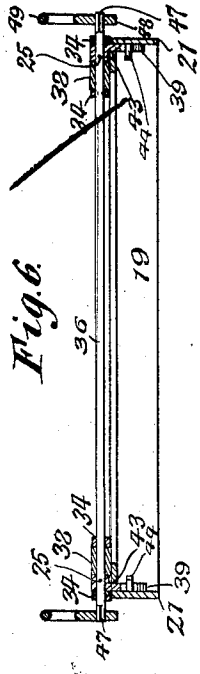
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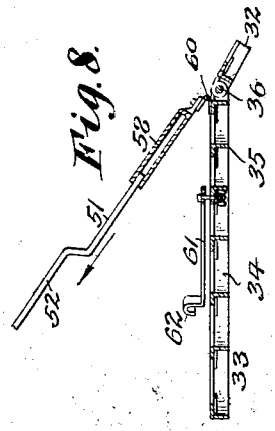
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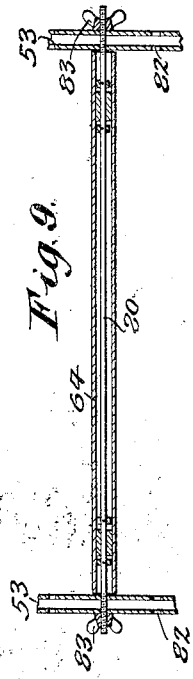
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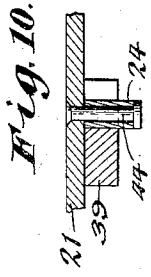
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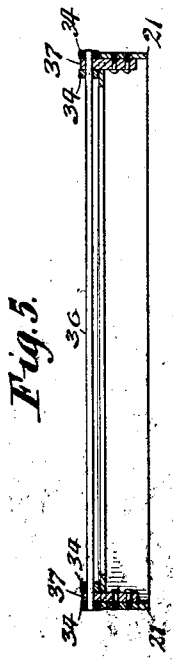
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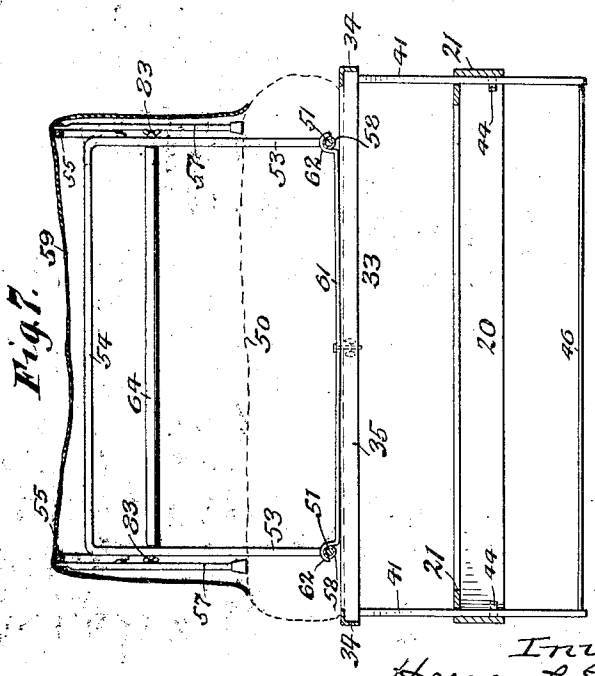












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ORTHOPEDIC BED

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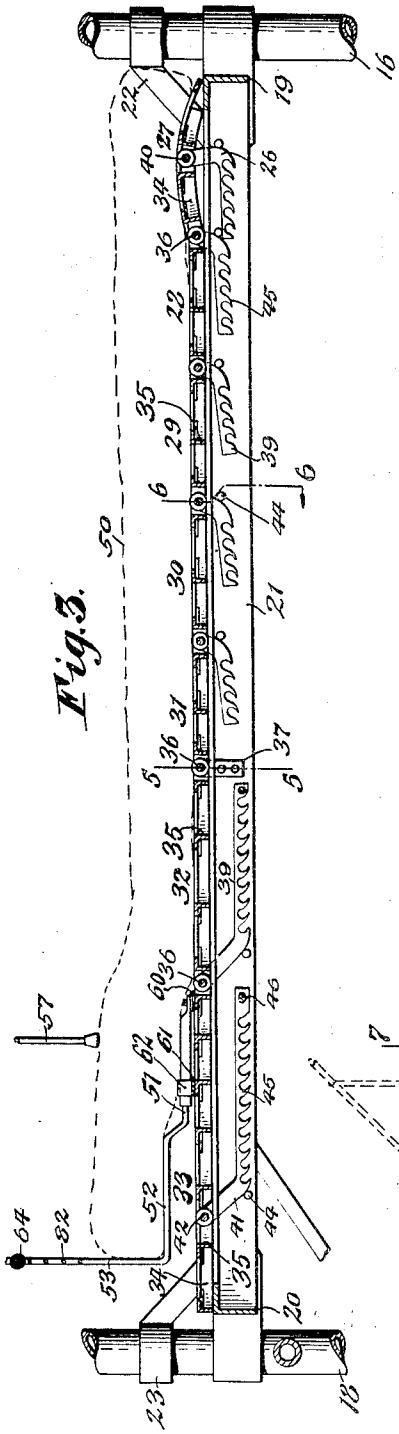


Fig. 3.

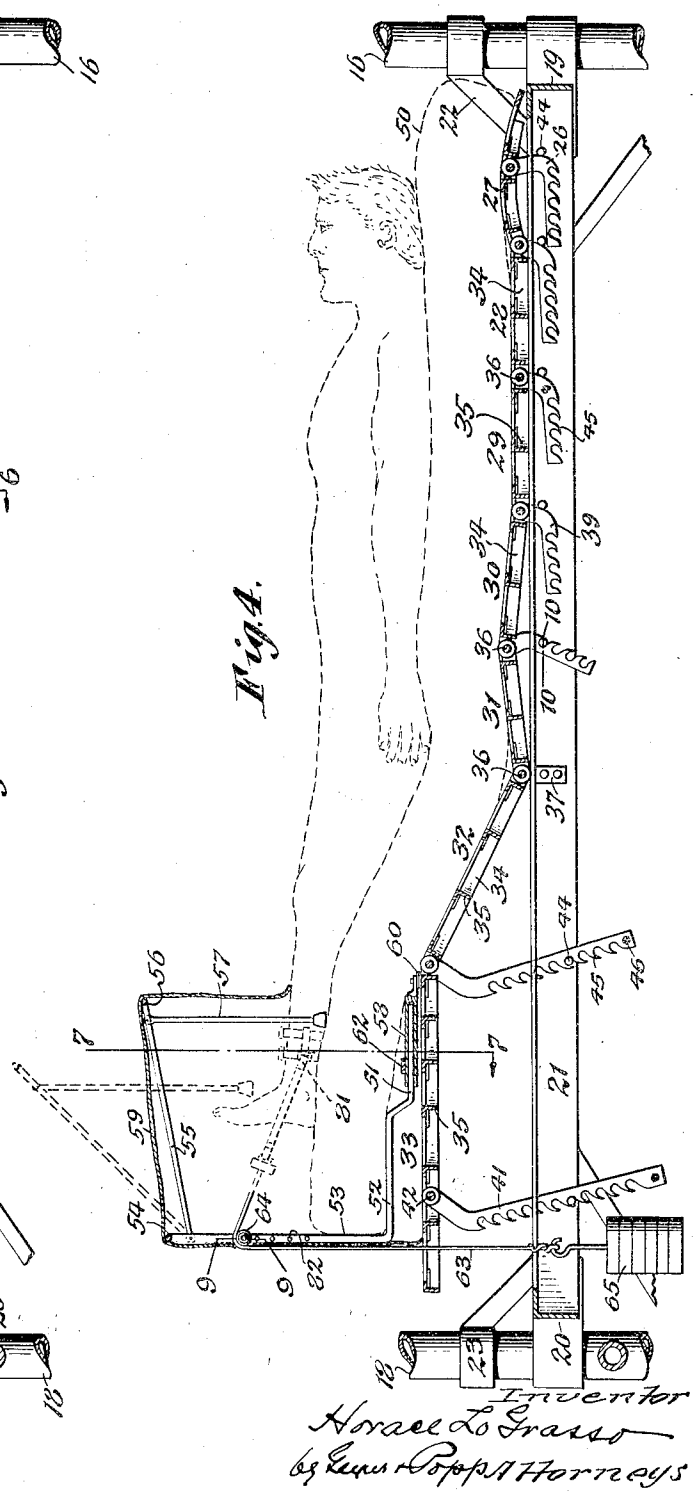


Fig. 4.

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UNITED STATES PATENT OFFICE.

HORACE LO GRASSO, OF PERRYSBURG, NEW YORK.

ORTHOPEDIC BED.

Application filed August 7, 1922. Serial No. 580,068.

To all whom it may concern:

Be it known that I, HORACE LO GRASSO, a citizen of the United States, residing in Perrysburg, in the county of Cattaraugus and State of New York, have invented new and useful Improvements in Orthopedic Beds, of which the following is a specification.

This invention relates to an invalid, orthopedic, or hospital bed which is more particularly designed for treating joint diseases of the knee, hip and spine, in order to prevent or correct deformities which might be or have been produced by these diseases, although this bed may also be used for the treatment of other maladies of a patient.

Heretofore such deformities have been prevented or corrected by the use of pillows placed under the patient to procure different relative positions of the several parts of the patient's body in accordance with the requirements and location of the disease, but these have been found quite unsatisfactory inasmuch as the same are not only cumbersome but also are unreliable because they do not stay in place and require frequent adjustment and thus take up an unnecessary amount of time of the attendant and needlessly disturb the patient.

One of the objects of this invention is to provide a so called "spring" or floor for a bed of this character which is so constructed that elevations or depressions can be formed in various parts thereof throughout the entire length of the same and thus enable different parts of the patient's body to be supported either in an abnormally raised or depressed position, as best suits the requirements for treating a particular diseased part of the patient's body.

Another object of this invention is to organize the bed so that the same may be readily used as a cradle and a traction when a longitudinal pull on any member of the patient's body is required to prevent the same from shortening.

A further object of this invention is to provide simple and efficient means whereby a canopy may be formed either over a part or over the whole of the bed in case it is necessary to keep the bed clothes away from a part or the whole of a patient's body.

In the accompanying drawings: Figure 1 is a perspective view of a bed constructed in accordance with my invention and adapted to form a cradle for the legs of a patient and also to raise the hip of the patient for effecting hyperextension. Figure 2 is a similar view showing the bed organized to form a wall around the patient when a covering for the same is to be omitted. Figure 3 is a fragmentary longitudinal sectional elevation of my improved bed showing the floor of the same straightened out into a substantially flat position for permitting normal use of the same. Figure 4 is a similar view showing the several parts adjusted for treating a hip having flexion deformity. Figures 5, 6 and 7 are vertical transverse sections taken on the correspondingly numbered lines in Figs. 3 and 4. Figure 8 is a fragmentary vertical longitudinal section similar to Figs. 3 and 4, but showing the canopy frame tilted into a position in which the same may be applied to and removed from the bed. Figure 9 is a vertical transverse section taken on line 9—9, Fig. 4. Figure 10 is a horizontal section taken on line 10—10, Fig. 4.

Similar characters of reference refer to like parts throughout the several views.

The main frame or body of the bed may be of any suitable construction, that shown in the drawings being an example of a satisfactory form and consisting of a front cross piece or head end 15 provided with supporting standards or legs 16, a rear cross piece or foot end 17 provided with supporting standards or legs 18, front and rear cross rails 19, 20 arranged adjacent to the head and foot ends, longitudinal rails 21 arranged on opposite longitudinal sides of the bed, and brackets 22, 23 connecting the corners of the transverse and longitudinal rails with the legs of the head and foot ends. Each of these rails is preferably constructed of angle iron having a vertical lower flange and a horizontal upper flange.

The "spring" or floor of the bed comprises a plurality of sections which are arranged in a longitudinal row between the front and rear cross pieces and across the space between the side rails and adjacent sections being pivotally connected with each other by transverse pivots so that each section may be raised or lowered and placed at various angles relative to an adjacent floor section to suit a particular requirement. Although the number of these floor sections

may be varied it has been found sufficient for all practical purposes to employ seven sections 27, 28, 29, 30, 31, 32, 33 which are arranged in a row lengthwise of the bed from the front cross piece of the frame to the rear cross piece of the same and across the side rails and which for convenience will be hereafter referred to, as the head, upper dorsal, lower dorsal, upper hip, lower hip, thigh and leg sections, respectively. These floor sections are all of the same width, but the same vary in length, the head section 27 being comparatively short, the dorsal and hip sections 28, 29, 30 and 31 of the same length or substantially so, the thigh section 32 being about twice the length of the hip and dorsal sections and the leg section 33 being about three times the length of a hip or dorsal section. Each of these floor sections may be variously constructed, but for the sake of lightness, the same are made up of skeleton form and preferably consist each of two longitudinal side bars 34 arranged over the frame rails and a plurality of cross bars 35 connecting the side bars at suitable intervals. The pivotal connection between each of these floor sections and an adjacent floor section is preferably effected by a transverse pivot rod 36 passing through openings formed in the opposing ends of the longitudinal bars of the respective floor sections.

The pivot rod 36 which connects the adjacent ends of the lower hip section and the thigh section is preferably mounted in the upper parts of stationary bearing lugs 37 which are secured at their lower ends to the rails of the bed frame somewhat in rear of a line midway of the length of the bed and substantially where the thigh of a patient lying in the bed would be normally located. The remaining pivot rods 36 are however free to move forwardly and backwardly in the direction of the length of the bed for the purpose of raising and lowering the several floor sections and changing their angular position relative to each other to suit the needs of the patient for treating a particular ailment. The leg section and the lower hip and thigh sections are not materially shifted lengthwise of the bed upon changing the angularity of the floor sections and when in their normal horizontal position these sections rest flatwise on the rails of the bed frame, as shown in Fig. 3. The upper hip, upper and lower dorsal and head sections upon being adjusted into an angular position are however moved lengthwise of the bed a considerable extent. In order therefore to permit these last mentioned floor sections when resting on the side rails to move freely therein and permit of easily adjusting these sections, each of the pivot rods connecting the upper hip section, upper and lower dorsal sections and head section is provided adjacent to its opposite ends with anti-friction rollers 38 which run lengthwise on the upper horizontal flanges of the side rails of the bed frame, as best shown in Fig. 6.

Various means may be employed for retaining the several sections of the floor at different elevations and angular positions but those shown in the drawings as an example have been found satisfactory in practice and consist of a pair of adjusting arms 39 mounted at opposite ends of each of the pivot rods 36 except the one which connects the thigh section and the lower hip section of the floor, and similar adjusting arms 26 are also mounted at their upper ends on a pivot rod 40 mounted transversely on the underside of the head section between its front and rear transverse edges and similar adjusting arms 41 are also mounted at their upper ends on a pivot rod 42 which is mounted transversely on the underside of the leg section adjacent to its rear transverse edge. Each of these adjusting arms is preferably of elbow shape and extends from its pivot rod downwardly through a slot 43 in the upper flange of the adjacent longitudinal rail so that this arm is guided relatively thereto in its vertical movements upon raising and lowering the floor sections with which it is connected. Each of these adjusting arms when not in use has its outer branch arranged in a substantially horizontal position along the inner side of the vertical flange of the respective rail in which position the same is held by engaging the elbow of each of these arms with an adjusting pin 44 arranged on the adjacent inner part of the vertical flange of the companion longitudinal rail. By this means these adjusting arms when not in use are concealed behind the side rails of the bed and are not liable to interfere with the bed clothing or other parts while attending a patient. On the outer longitudinal edge of the free end of each of these adjusting arms the same is provided with a longitudinal row of oblique notches forming hooks 45 one or another of which is adapted to engage with the adjacent adjusting pin 44 for holding the respective arm and the sections of the floor connected therewith at different heights and angles relative to the bed frame. Friction of the adjusting arms upon sliding over the pins 44 is preferably reduced by providing each of these pins with an antifriction roller 24. If desired the free ends of each pair of adjusting rods on the same pivot pin may be connected by a horizontal tie rod 46 whereby these arms are maintained in alinement with each other. This is more particularly desirable in the case of the comparatively long adjusting arms which are connected with the leg and thigh sections of the floor to which these rods are applied in the

present instance, while the remaining adjusting arms, which are comparatively short are not provided with such tie rods, as shown in Figs. 1, 3 and 4.

The raising of the floor sections and the moving of the adjusting arms into and out of engagement with the adjusting pins is conveniently and easily effected by fastening the adjusting arms at their upper ends to their respective pivot rods by means of pins 25, or otherwise and making the extremities 47 of each of these rods of square form so as to permit of detachably applying thereto the correspondingly shaped sockets 48 of handles 49, as shown in Figs. 1 and 6. By this means any one of the pivot rods 36 having adjusting arms may be turned by the attendants upon applying handles to the ends of the respective pivot rods and also raised or lowered for bringing the particular part of the bed floor to the desired elevation and angle and then retaining the same there.

Over this floor of the bed any suitable bedding for the patient may be placed, such as the usual mattress 50, the contour of which will be altered in accordance with the position of the several sections of the floor.

In the position of the several floor sections the head and dorsal sections are raised slightly, the hip sections are raised a greater extent, the thigh section is inclined at a considerable angle and the leg section is arranged horizontally and comparatively high, which position of the parts would be adapted for a patient requiring an elevated foot rest for one or both legs which would be formed by the right and leg sections, also a slight elevation of the hip to correct hyper-extension of the same, also a slight elevation of the back to prevent or correct dorsal deformities and also a slight elevation of the head section to support the head of the patient in the most comfortable or desirable position.

In Fig. 4 the leg section is elevated a considerable extent, and the thigh section inclined accordingly and the hip sections are raised slightly which position of the parts would be suitable for treating a patient to prevent or correct flexion deformity of the hip. In like manner, the contour of this floor may be altered to suit the requirements of various ailments for which the patient is to be treated and which necessitate elevating one part of the patient relative to another while in a reclining posture.

When the nature of the ailment which is to be prevented or corrected requires the bed covering to be held away from the legs of the patient, a cradle is provided whereby a canopy may be formed over the legs of the patient. This cradle in its preferred form comprises two lower longitudinal rods arranged horizontally over the rear part of the floor adjacent to the longitudinal edges thereof and each being bent so as to form a depressed lower part 51 and an elevated rear part 52, two upright rear posts 53 extending upwardly from the rear ends of the lower bars, an upper rear cross bar 54 connecting the upper ends of the rear posts, two upper longitudinal rods 55 pivoted at their rear ends to the upper ends of the rear posts to swing vertically, a front upper cross rod 56 connecting the front ends of the upper longitudinal rods, and front posts 57 pivotally connected at their upper ends with the front parts of the upper longitudinal rods to swing forwardly and backwardly. This cradle when in use is arranged over the leg section of the floor and has the front ends of its lower longitudinal rods detachably seated in rearwardly opening sockets 58 mounted on the upper front part of the leg section of the floor while the front posts rest with their lower ends on the adjacent part of the mattress. The patient's legs project into this cradle from the front side of the same and are covered by a drape or canopy 59 extending over the cradle, as shown in Fig. 4, thereby protecting the legs without bearing the weight of the covering which is necessary in the treatment of the same forms of disease.

When not required the cradle may be removed from the bed by disengaging its lower rods from the sockets. In order to permit the rearward withdrawal of the lower rods of the cradle from the sockets and still enable the crade to be arranged close to the rear end or cross piece of the bed, each of the sockets is pivoted at its front end to the leg section of the floor by a hinge 60 whereby these sockets can be tilted, as shown in Fig. 8, so that the cradle can be passed at an angle over the rear or tail piece of the bed, for the purpose of engaging and disengaging the lower rods of the same with the sockets. When the cradle is installed, the front part of the same may be readily raised and lowered by swinging the upper longitudinal rods of the same upwardly into the position shown by dotted lines in Fig. 4, whereby access to the parts of the patient within the cradle is afforded. The sockets are normally held in position against the upper side of the leg section of the floor by a retaining bar 61 pivoted at its center to the top of the leg section so as to be capable of swinging horizontally into and out of its operative position and provided at opposite ends with catches or jaws 62 which engage over the sockets, as shown in Fig. 7.

If the patient requires traction treatment for the purpose of preventing or correcting flexion deformity of the hip or similar ailment the cradle may be utilized as part of a device for applying a traction to the leg of the patient or other member of the same. In its preferred form this traction comprises

a cord or line 63 running over a roller 64 mounted on the rear part of the cradle and having its forwardly extending front part connected by a harness or shackle 81 with the leg of the patient while the downwardly extending rear part of the same is connected at its lower end with a weight 65, whereby a backward pull or traction effect is exerted on the leg of the patient resting on the bed and treatment for preventing or correcting the flexion deformity above referred to, is effected.

The traction roller is rotatably mounted on a horizontal transverse rod 80 which latter passes at its ends through one or another corresponding pair of openings 82 arranged in vertical rows on the rear posts of the cradle and held therein by clamping screw nuts 83, as shown in Figs. 1, 3, 5, 7 and 9. By this means the line of pull of the traction may be varied to suit the needs of the patient.

Means are provided for forming a wall around the bed to enclose the patient at the sides without covering the patient when this is required. In the preferred construction, this is accomplished by securing the ends of two longitudinal bars 66 and the ends of two cross bars 67 to the upper ends of the legs or posts forming part of the head and foot pieces of the bed frame and suspending longitudinal walls, drapes or curtains 68 and transverse walls, drapes or curtains 69 from these bars so that the lower ends of these walls extend to the floor of the bed and thus form a side enclosure around the patient, as shown in Fig. 2. These walls are preferably constructed of suitable fabric and the same are detachably connected by providing each of these walls at its upper end with a hem 70 which is slipped over one of the wall bars, and the latter are detachably secured to the head and foot pieces of the bed frame by means of nuts or bolts 71, as shown in Fig. 7.

It will be noted that in the foregoing construction that several floor sections are pivotally connected so that the same in effect form the links of a chain and that the several floor sections form two groups, a front group comprising the head section, upper and lower dorsal sections and upper and lower hip sections, and a rear group comprising the thigh section and leg section, which groups are arranged on opposite sides of the point where the opposing thigh and lower hip section are pivoted on the frame.

I claim as my invention:

1. An orthopedic bed comprising a frame, and a floor having a plurality of sections arranged in a longitudinal row and pivotally connected with each other by transverse pivots so that the several sections form in effect the links of a chain, said frame being provided with adjusting pins, and adjusting arms extending from said pivots downwardly and each provided with a longitudinal row of hooks adapted to engage one of said pins.

2. An orthopedic bed comprising a frame, and a floor having a plurality of sections arranged in a longitudinal row and pivotally connected with each other by transverse pivots so that the several sections form in effect the links of a chain, said frame being provided with adjusting pins, and elbow shaped adjusting arms extending downwardly from said pivots and each having a longitudinal row of hooks adapted to engage one of said pins.

3. An orthopedic bed comprising a frame, and a floor having a plurality of sections arranged in a longitudinal row and pivotally connected with each other to form in effect the links of a chain, said sections comprising a head section, an upper dorsal section, a lower dorsal section, an upper hip section, a lower hip section, a thigh section, and a leg section.

4. An orthopedic bed comprising a frame, and a floor having a plurality of sections arranged in a longitudinal row and pivotally connected with each other to form in effect the links of a chain, said sections comprising a head section, an upper dorsal section, a lower dorsal section, an upper hip section, a lower hip section, a thigh section, and a leg section, and lugs on said frame on which the pivotal connection between the thigh and lower hip section is mounted.

5. An orthopedic bed comprising a frame, a floor having a plurality of sections arranged in a longitudinal row, pivot rods pivotally connecting adjacent floor sections, handles connected with the ends of said pivot rods, adjusting arms connected with said pivot rods, and adjusting pins arranged on said frame and adapted to be engaged by said arms.

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