March 14, 1950 A. J. TAYLOR 2,500,742

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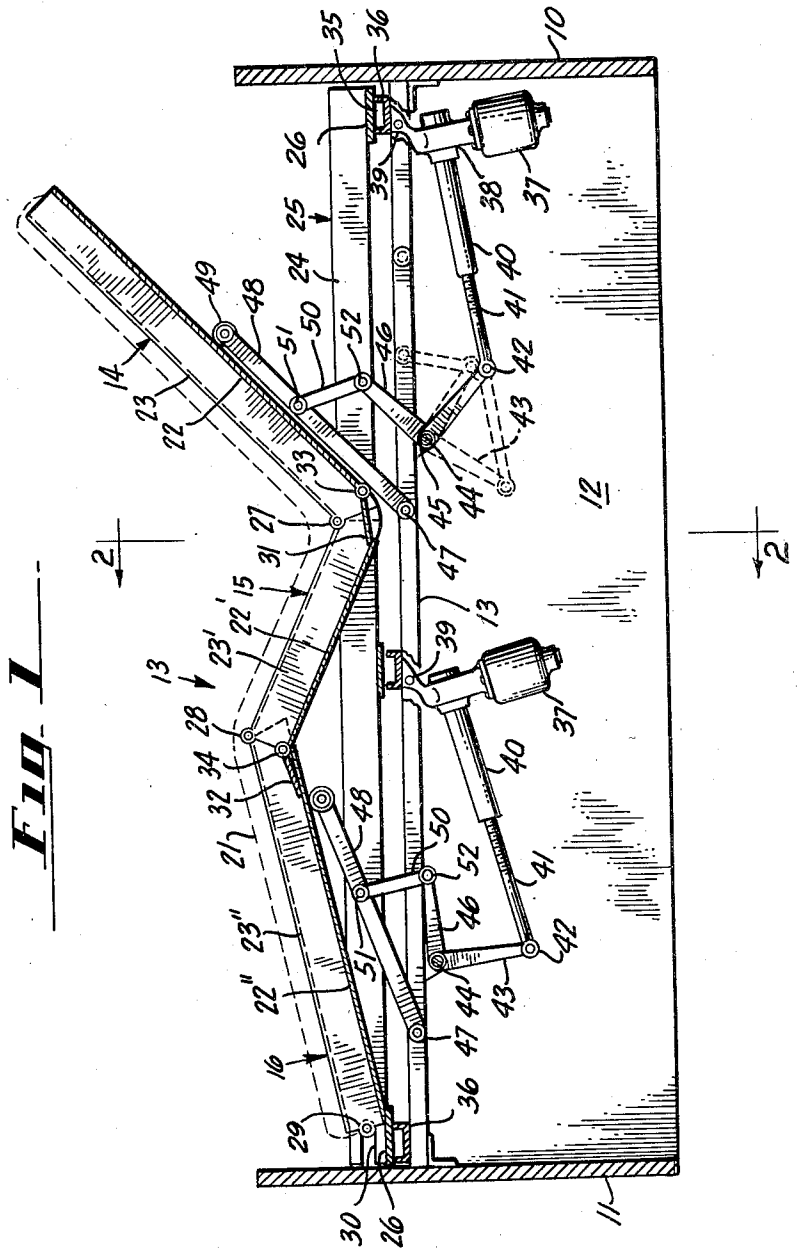


Fig. 1

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Fig. 2

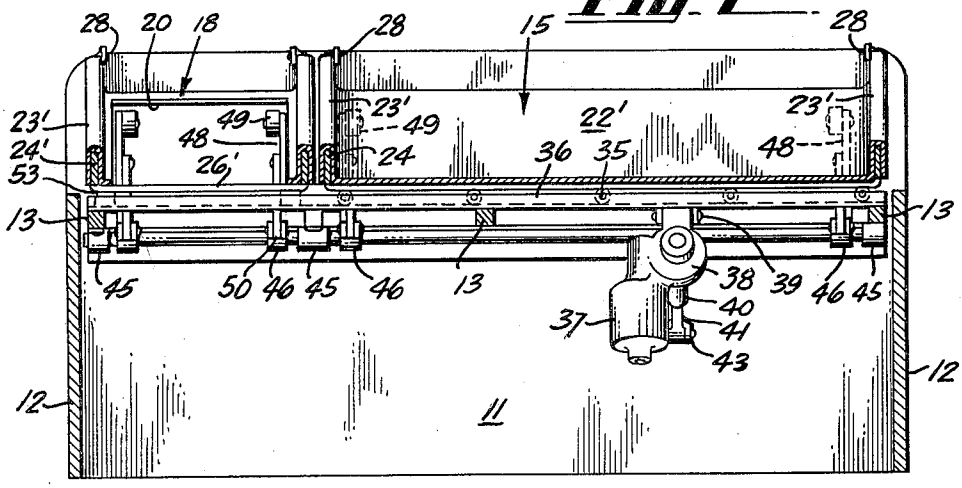
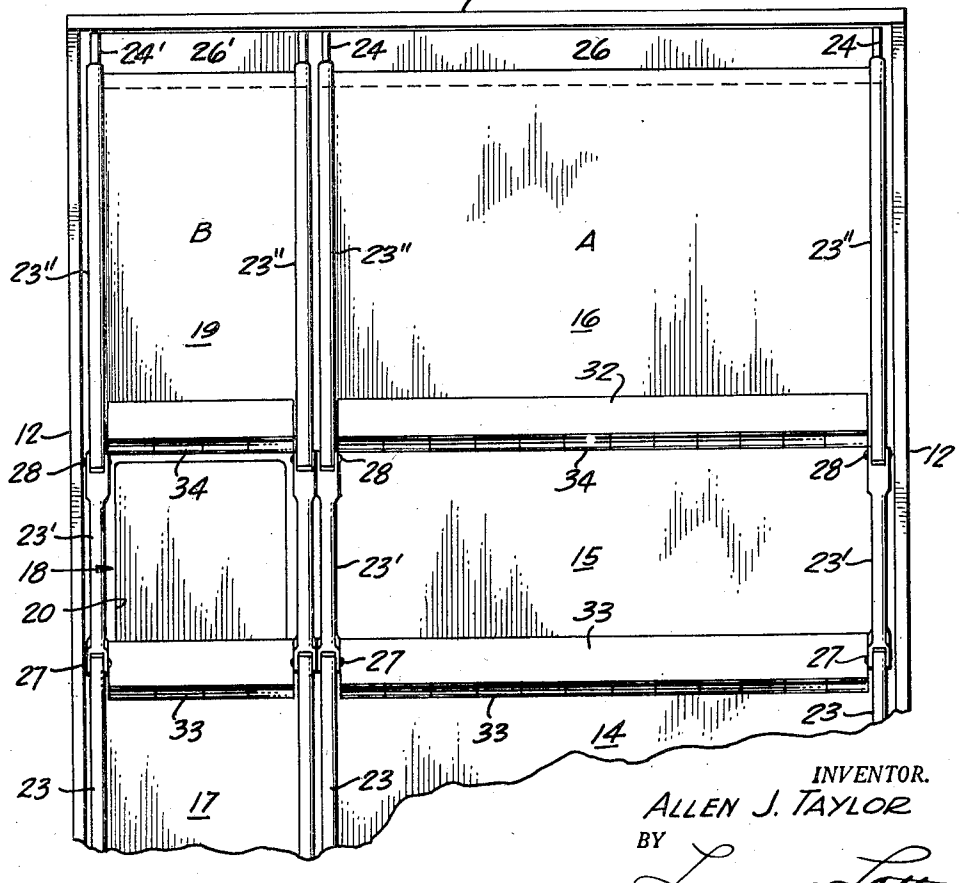


Fig. 3



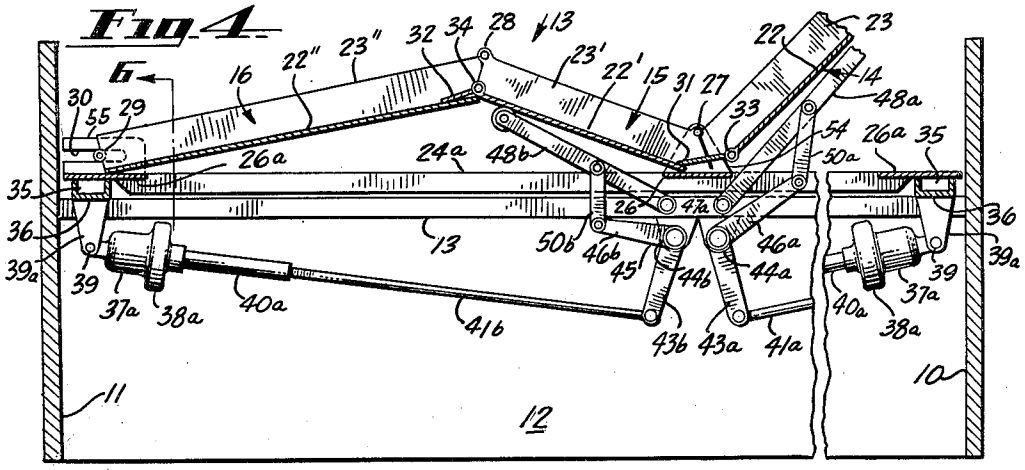
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Fig. 4



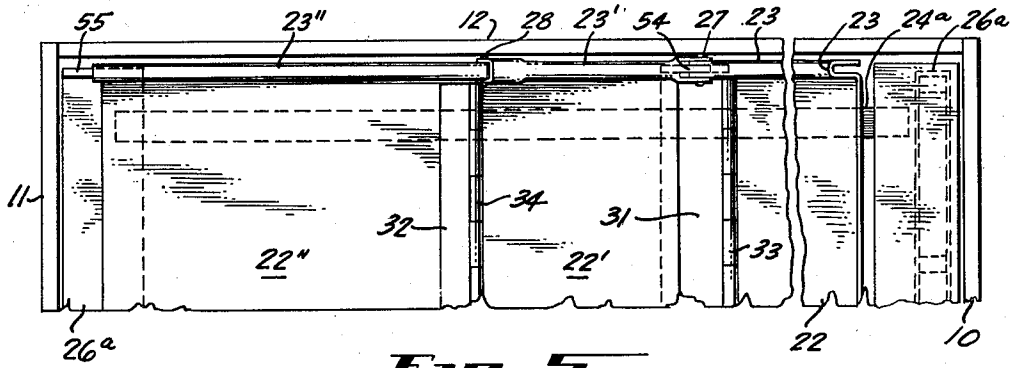


Fig. 5

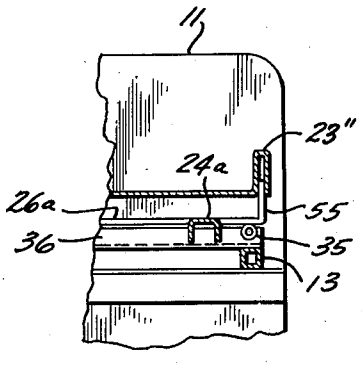


Fig. 6

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2,500,742

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Allan J. Taylor, Los Angeles, Calif., assignor, by direct and mesne assignments, of one-half to Marvel Beem, West Los Angeles, and one-half to The Beem Foundation, Los Angeles, Calif., a charitable trust of California

Application July 30, 1945, Serial No. 607,846

9 Claims. (Cl. 5—68)

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This invention relates to a bed of the type in which the mattress supporting frame is composed of sections that may be raised to inclined positions to support an occupant of the bed in a reclining posture in which the back is upright or partially so and the knees are somewhat bent. Such a frame ordinarily comprises a back section, a thigh section, and a leg section, with the back and thigh sections hinged, where they adjoin each other, to the fixed frame of the bed and with the leg section hinged at one end to the thigh section and free to slide longitudinally at its other end as the thigh section is elevated and lowered.

One of the objects of the invention is to provide a bed of this type in which the vertical frame structure of the bed, including the head and foot, comprises solid panels cooperating to form a cabinet for enclosing operating mechanism. The foot end of the leg section must move up to a position closely adjacent the foot of the bed as it is lowered to its horizontal position.

Where the leg section, in being lowered from an inclined position to a horizontal position, moves up to a position closely adjacent a solid transverse frame member, there exists a dangerous possibility of a nurse or patient catching a toe or finger between the end of the leg section and such frame member. The likelihood of extremities of the bed covering becoming caught between the approaching members also constitutes a problem. The fixed longitudinal frame members of the bed, to which the mattress frame sections are hinged, if exposed at the sides of such frame sections, may also provide the possibility of members becoming pinched between such fixed frame members and the movable mattress supporting frame members. With such problems in mind, the invention has as one of its objects to provide a bed having an articulating mattress supporting frame so constructed and arranged as to minimize the possibility of injury or damage resulting from the raising and lowering movements of the frame sections.

Another object of the invention is to provide a bed having a mattress supporting frame comprising a plurality of articulated sections which are so constructed as to accommodate a mattress of maximum depth without requiring too much space vertically of the bed. Toward the attainment of this result, the invention contemplates a frame which will support the mattress without adding appreciably to the depth of space required for accommodating the mattress alone.

Another object of the invention is to provide a bed having a mattress supporting frame which

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may be transferred bodily from the bed to an ambulatory cart so as to minimize the disturbing of a hospital patient in transferring him to and from an operating room, or to and from a sunning patio, etc. In connection with this general object, the invention aims to provide a removable bed portion which incorporates hinged sections that may be elevated when such removable bed portion is in place in the bed, and to provide elevating mechanism operable to effect such elevating and at the same time retractable to a position where the removal of the removable portion will not be interfered with.

Another object is to provide elevating mechanism operable to separately raise both head and leg sections of the bed, yet of maximum simplicity and relatively inexpensive in construction.

Other objects of the invention will become apparent from a perusal of the following specifications, taken in connection with the appended drawings, in which:

Fig. 1 is a longitudinal sectional view of a bed embodying the invention;

Fig. 2 is a transverse sectional view of the same, taken on the line 2—2 of Fig. 1;

Fig. 3 is a partial plan view of the same;

Fig. 4 is a longitudinal sectional view through a portion of a bed embodying a modified form of the invention;

Fig. 5 is a plan view of a portion of the bed shown in Fig. 4; and

Fig. 6 is a detail vertical sectional view taken on the line 6—6 of Fig. 4.

As an example of one form in which the invention may be embodied, I have shown in Figs. 1, 2 and 3 a bed comprising a head panel 10, a foot panel 11, and side panels 12, cooperating with a mattress supporting frame 13 (when the latter is in a horizontal position) to define a cabinet-like enclosure for apparatus and operating structure which may form part of the bed mechanism. The head and foot panels are connected by longitudinal rails 13 to form a fixed frame on which the rest of the bed mechanism is supported.

Supported on the fixed frame are a pair of mattress supporting frames A and B, each of which is articulated, the frame A comprising a back section 14, a thigh section 15, and a leg section 16; and the frame B comprising a back section 17, a thigh section 18, and a leg section 19. The frame B provides a seat for a toilet which may be arranged to cooperate with an opening 20 therein. A mattress, properly designed to provide an opening to register with the opening 20, is supported by the frame B.

The frame A supports a mattress which provides the normal supporting area of the bed, from which the patient may shift to the toilet side of the bed when the toilet is to be used. The mattress is indicated in broken lines at 21 in Fig. 1, and is, as indicated, adapted to freely bend in unison with its supporting frame. A sponge or foam rubber mattress has been found to be suitable for this purpose.

Each of the mattres frame sections comprises a flat bottom web 22 and side channels 23 all formed integrally from sheet metal. The channels 23 extend upwardly from the web portions 22, and open downwardly. In the frame A, the channels 23 embrace longitudinal rails 24 of a removable frame 25 which includes transverse bars 26 joining the rails 24 in spaced relation. The channels 23 of the frame section 14, and the channels 23 of the frame section 15 are hinged to each other and to the rail 24 by hinges 27. The channels 23' are hinged to the channels 23'' of the frame section 16, by hinges 28. The foot ends of the channels 23'' are slidingly supported on the rails 24. When the frame is lowered to its horizontal position, the channels 23, 23' and 23'' receive the rails 24, being of just sufficient width to freely slide over the rails.

The foot end of the web portion 22'' of the frame section 16 has its edge in sliding engagement with the smooth upper surface of the cross bar 26 at the foot of the ambulatory frame 25, and since the web is only of sheet metal thickness, the likelihood of a bodily extremity becoming pinched between the edge of the web and the foot panel 11, is practically nil. Also, since the rails 24 traverse the spaces between the ends of the channels 23'' and the foot panel 11 when the frame section 16 is raised, it is substantially impossible for an extremity to become pinched between a channel and the foot panel.

In order to avoid the necessity for the sliding engagement between the edges of the channels 23'' and the web 22'' to carry the weight of the leg frame section 16 and its load, I provide rollers 29, journalled in the channels 23'' and operating in track slots 30 in the rails 24.

The hinges 27 and 28 are located at or near the upper extremities of the channels 23 in order that the hinge axes may intersect the mattress (which will be of such thickness as to extend substantially above the frame sections) and thereby facilitate the bending of the mattress in conformity to the bending of the frame. Consequently, the adjacent edges of the channels 23, 23' and 23'' must separate and move together as the frame is articulated downwardly and upwardly respectively. To cover the gaps that would otherwise be formed between the webs as the result of such separation, I provide bridging panels 31 and 32 which are hinged at 33 and 34 to the webs 22 and 22' respectively, and which have their free edges in sliding bearing engagement with the upper surfaces of the webs 22' and 22'' respectively. The panel 31 moves toward the hinge 27 as the sections 14 and 15 are raised, thus assisting the mattress to make a bend of broader radius and minimizing tension strains in the lower side of the mattress at this bend.

The ambulatory frame 25 is supported on rollers 35 journalled in cross frame members 36 of the fixed frame. Traveling on the rollers 35, the frame 25 may be shifted laterally from the bed onto a suitable ambulatory cart.

My improved mechanism for elevating the

frame sections involves the use of identical power units, each comprising an electric motor 37 attached to a reduction gear unit 38 which is suspended from a frame member 36 through a pivotal connection 39. Each reduction gear 38 forms part of a screw jack also including an interiorly threaded sleeve 40 driven through the gear unit, and a threaded rod 41 threaded into the sleeve 40.

The free end of the rod 41 is pivoted, at 42, to a lever 43 which is attached to a transverse shaft 44 journalled in bearings 45 suspended from the rails 13. Secured to the shaft 45 are two pairs of arms 46, one pair being located beneath the respective sides of the frame A and the other pair being located beneath the respective sides of the frame B. Above the arms 46, and pivoted to the fixed frame rails 13 as at 47, are arms 48 each of which carries a roller 49 engaging the under side of a web portion of a mattress frame section. Each arm 48 is connected to a corresponding arm 46 by a link 50 and pivotal connections 51 and 52 between the link and the respective arms. The arms 48 are adapted to swing from horizontal positions, in the plane of the rails 13, to the elevated positions shown, and, in doing so, to raise the respective back and leg sections of the bed to the elevated positions shown, or to any intermediate position. When in their horizontal, retracted positions, the arms 48 are removed from the path of horizontal movement of the ambulatory frame 25, so as to permit the removal of the same from the bed.

One of the shafts, with its associated mechanism, is located beneath the head sections 14 and 17, and serves these two sections. The other shaft 44 is located beneath the leg sections 16 and 19, and its associated mechanism serves these two sections. The two elevating mechanisms are identical, thus simplifying the problems of manufacture and servicing.

In the operation of the elevating mechanism, drive is transmitted from the motors to the reduction gear units 38 to rotate the threaded sleeves 40. The motors 37 are reversible, and suitable controls for energizing the motors in both directions, are provided. In one direction of operation, the threaded rods 41 will be drawn into the sleeves 40, causing the levers 43 and arms 46 and 48 to swing counter-clockwise, as viewed in Fig. 1, thereby raising the head and leg sections of the bed. By operating the motors in the opposite directions, the shafts 41 will be extended from the sleeves 40, permitting the head and leg sections to settle back toward horizontal positions. Either motor may be operated separately, so as to raise or lower only the head sections or the foot sections of the bed, as the case may be.

The channeled construction of the mattress frame sections makes it possible to employ mattresses of ample depth for maximum comfort without unduly increasing the height of the upper surface of the complete bed. The side channels 23 serve to retain the mattress and to conceal a substantial portion of its edge area. Their channeled construction provides framing rigidity for the bed sections, and conceals the frame rails 24 when the sections are in their lowered positions.

The toilet seat frame B is mounted on a fixed frame similar to the frame 25 and comprising longitudinal rails 24' and cross bars 26'. The bars 26' are secured to the transverse members 36 as indicated at 53.

The form of the invention shown in Figs. 4, 5

and 6 adds the improved feature of substantially eliminating any possibility of a finger or bedclothes becoming pinched between the mattress supporting sections and the rails 24 and 24'. In this form of the invention, the frame 25a is constructed with longitudinal rails 24a which are spaced inwardly from the lateral extremities of the mattress frame sections, being welded or otherwise suitably secured to the cross frame members 26a as indicated. The members 26a extend beyond the rails 24a and are provided at their ends with upturned bracket and flange members 54 and 55. The brackets 54 connect the hinges 27 to the fixed frame, and the flanges 55 are received in the channels 23'' and close the gaps between the ends of these flanges and the foot panel of the bed.

The elevating mechanism of the form shown in Fig. 4 differs from that described in connection with the other forms of the invention, in that the arms 48a and 48b and the levers 43a and 43b are fulcrumed on pivots 47a and 47b and shafts 44a and 44b respectively on axes that are disposed closely adjacent each other below the axis of the hinges 27, and the arms 48b and 46b extend in the opposite direction from the arms 48a and 46a. Also, the arms 48b act against the thigh sections 15 and 18 instead of the leg sections of the bed, and the screw jacks act in opposed relation rather than in the same direction. Each power unit comprises a motor 37a and reduction gearing 38a, the motor 37a in each instance being pivoted at 39 to a bracket 38a attached to a cross frame member 36. Other features of this bed are similar to those of the bed shown in Figs. 1, 2 and 3, and are referred to by similar reference numerals.

I claim as my invention:

1. A bed comprising a frame having a transverse member and longitudinal rails, and a raisable mattress supporting frame section having side flanges comprising downwardly opening channels receiving said rails and having end portions slidable thereon adjacent said transverse member but spaced therefrom by gaps, the width of which varies with sliding movement of said end portions, said rails traversing said gaps so as to prevent the entrance into said gaps of members that might otherwise become pinched therein.

2. A bed as defined in claim 1, wherein said side flanges are provided with rollers journalled in said channels, and wherein said rails are provided with longitudinal slots forming tracks in which said rollers operate to support the said flanges for longitudinal movement.

3. A bed comprising a horizontal frame having flat longitudinal rails arranged in spaced vertical planes and transverse members connecting said rails, and a raisable mattress supporting frame comprising a head section and a thigh section hinged to said rails and a foot section hinged to said thigh section, said sections having side flange members comprising downwardly opening channels receiving said rails when the sections are in horizontal positions, said sections being adapted to be raised to elevated, inclined positions.

4. A bed as defined in claim 3, wherein there are gaps between the ends of said channels and one of said transverse frame members and wherein said rails traverse said gaps so as to prevent the entrance into said gaps of members that might otherwise become pinched therein.

5. A bed as defined in claim 3, including a fixed frame on which said horizontal frame is supported for horizontal translational movement to permit removal of the same from the fixed frame and its transfer to an ambulatory cart.

6. A bed comprising a fixed frame, a removable horizontal frame supported thereon for horizontal translational movement whereby it may be removed from the bed, a mattress supporting frame supported upon said removable frame and comprising a head section and a thigh section hinged to the removable frame and a foot section hinged to said thigh section, and elevating means comprising a pair of arms pivoted to the fixed frame and adapted to move from positions disposed below the plane of said removable frame to positions contacting a section of said removable frame and raising the same to an inclined position, bell crank lever means pivoted to said fixed frame and linked to said arms, and a power unit pivoted at one end to said bell crank means and at its other end to the fixed frame.

7. A bed comprising a fixed frame, a removable horizontal frame supported thereon for horizontal translational movement whereby it may be removed from the bed, a mattress supporting frame supported upon said removable frame and comprising a head section and a thigh section hinged to the removable frame and a foot section hinged to said thigh section, and elevating means comprising a pair of arms pivoted to the fixed frame and adapted to move from positions disposed below the plane of said removable frame to positions contacting a section of said removable frame and raising the same to an inclined position, bell crank lever means pivoted to said fixed frame and linked to said arms, and a power unit pivoted at one end to said bell crank means and at its other end to the fixed frame, said power unit comprising a motor and reduction gear unit suspended from the fixed frame and a screw jack interposed between said reduction gear and said bell crank means.

8. A bed comprising a supporting frame and a mattress frame comprising a head section and a thigh section pivoted to said supporting frame, and a leg section pivoted to said thigh section, each of said sections comprising a bottom web and side flanges extending upwardly from the side extremities thereof, all formed integrally of sheet metal and defining collectively a pan for receiving and supporting a mattress, said sections being connected by hinges between adjacent ends of said side flanges near the upper ends thereof and including bridging panels each hinged to an end of one section and slidably resting upon the upper surface of the web portion of an adjacent section.

9. A bed comprising a supporting frame and a mattress frame comprising a head section and a thigh section pivoted to said supporting frame and a leg section pivoted to said thigh section, each of said sections comprising a bottom web and side flanges extending upwardly from the side extremities thereof, all formed integrally of sheet metal and defining collectively a pan for receiving and supporting a mattress, said supporting frame including a transverse connecting member and an adjacent upright foot panel, said connecting member having a flat upper surface, the end of the web portion of the leg section being slidably associated with said surface and spaced from said foot panel by a gap, said connecting member traversing said gap to prevent the entry into said gap of a member that might

otherwise become pinched therein in the lowering movement of the foot section.

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