April 1, 1952 R. E. BEEGLE 2,590,920

HEALTH BED

Filed April 23, 1947 3 Sheets-Sheet 1

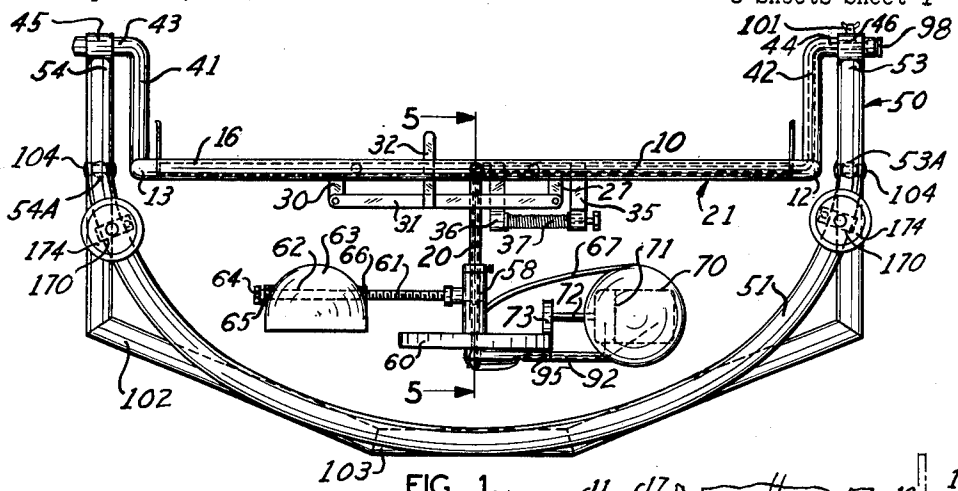


FIG. 1.

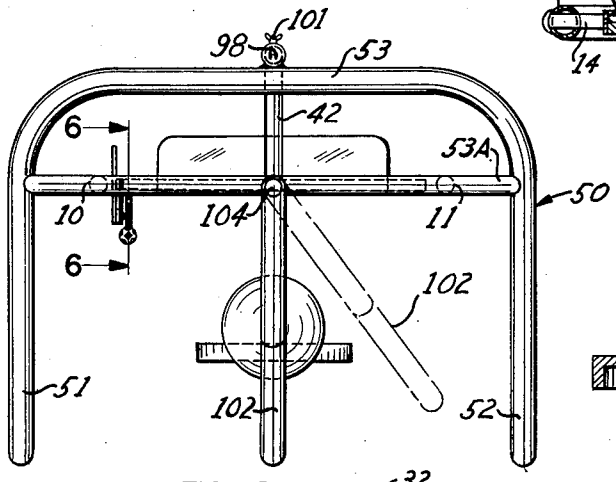


FIG. 2.

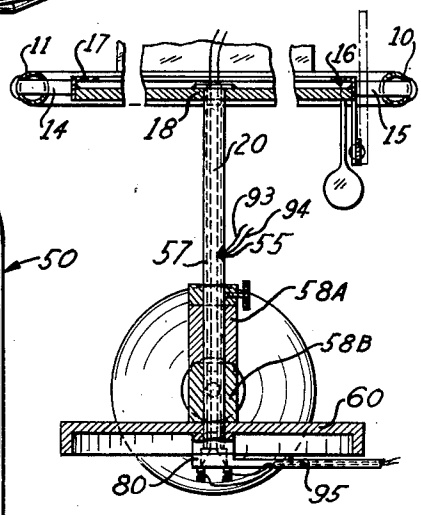


FIG. 5.

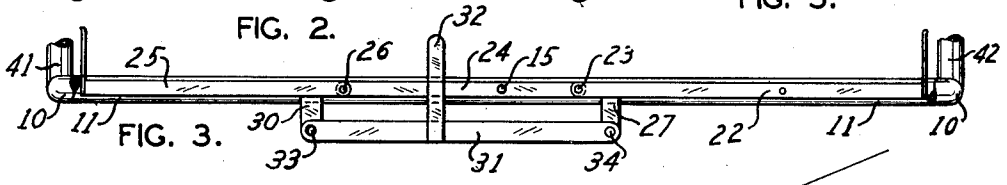


FIG. 3.

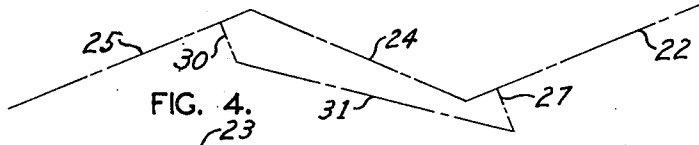


FIG. 4.

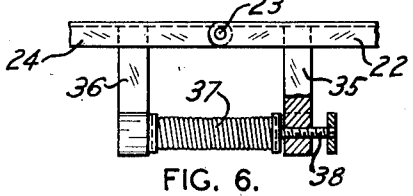


FIG. 6.

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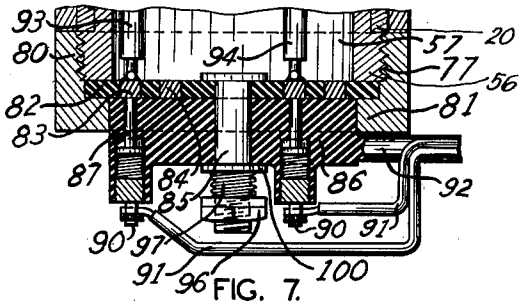


FIG. 7.

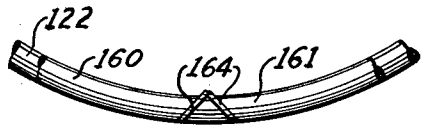


FIG. 10.

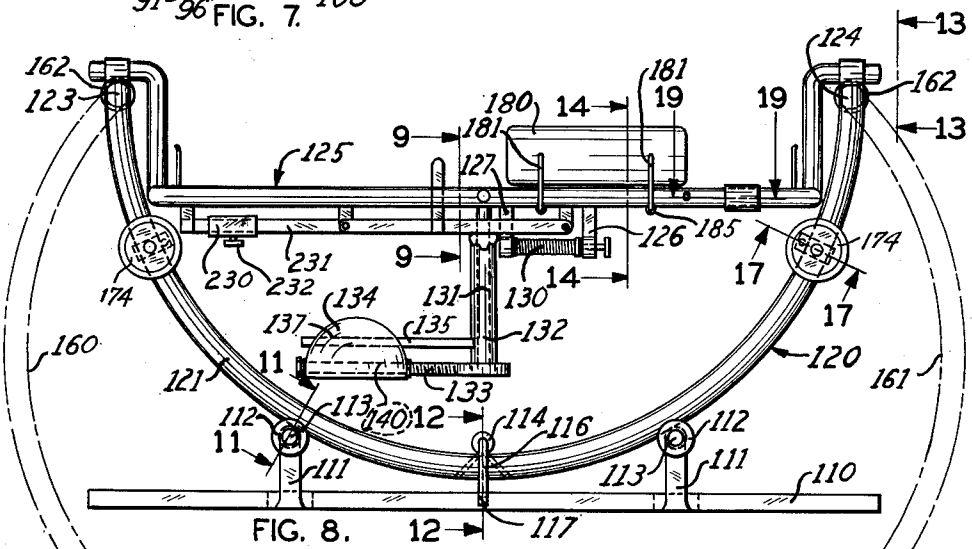


FIG. 8.

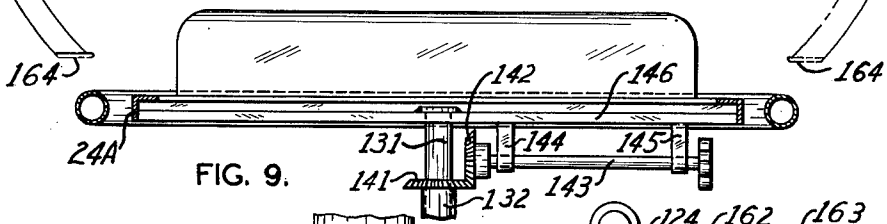


FIG. 9.

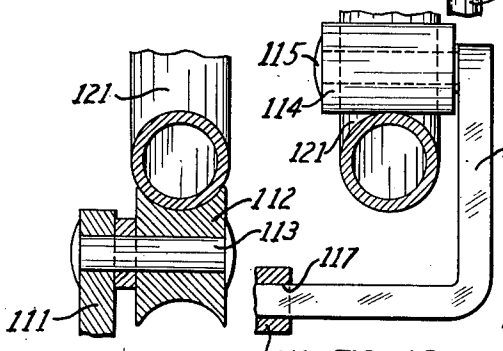


FIG. 11. FIG. 12.

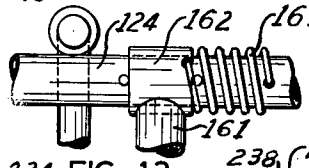


FIG. 13.

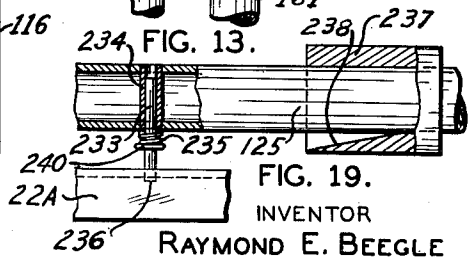


FIG. 19.

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HEALTH BED

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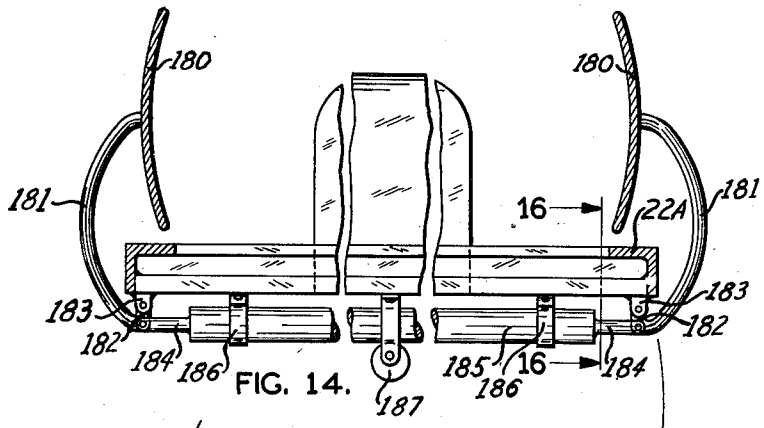


FIG. 14.

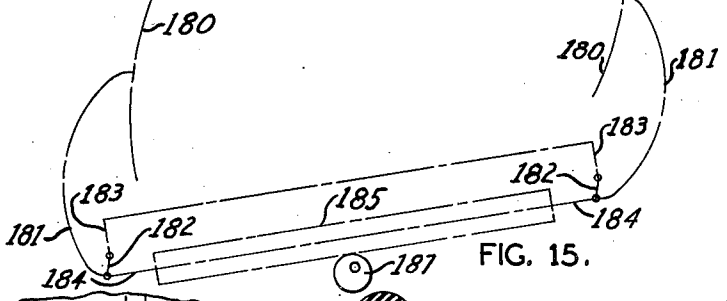


FIG. 15.

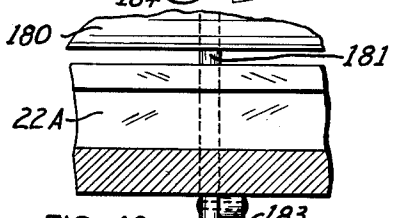


FIG. 16.

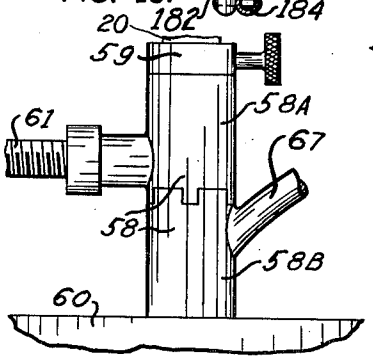


FIG. 18.

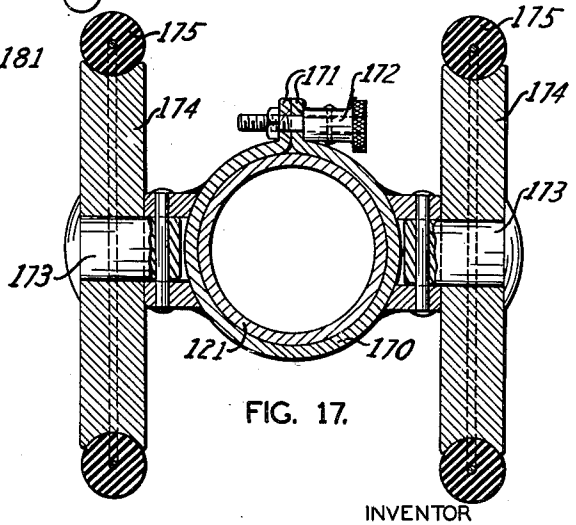


FIG. 17.

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Patented Apr. 1, 1952

2,590,920

UNITED STATES PATENT OFFICE

2,590,920

HEALTH BED

Raymond E. Beegle, East St. Louis, Ill.

Application April 23, 1947, Serial No. 743,403

23 Claims. (Cl. 128—33)

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This invention relates to improvements in health beds and more particularly to beds susceptible of swinging, pivotal, oscillatory, or related movements, adapted particularly to conduce to sleep, to promote physical well being and to assist in recuperation subsequent to various illnesses and surgery. The bed may be used for a variety of purposes with many therapeutic advantages.

Due particularly to current tendencies among those of the medical and surgical professions toward promoting a reasonable physical activity as soon as possible after surgery, and for various other therapeutic advantages, there has arisen a need for a low cost, sturdy and entirely safe health bed offering numerous personal physical benefits not heretofore obtainable with any of the adjustable beds, wheel chairs, invalid and hospital beds of the numerous types investigated and otherwise known to this applicant. Accordingly the present invention has, as a primary object, the attainment of the advantages heretofore only briefly and not exhaustively mentioned.

A further and important object of the invention is attained in a health bed, suitable for use as an invalid's bed, for the purpose of imparting to the body gentle changes in position, the rate, nature and extent of which are subject to regulation to meet the wishes and requirements of the individual patient.

A further objective advantage of the present improvements is attained in a bed assembly which is provided with means for imparting thereto, preferably without, or with only a minimal effort on the part of the occupant, a gentle, low-rate oscillatory movement, which preferably is not confined to a swinging movement in a given single plane or direction, and is of such nature as to promote circulation, to conduce to sleep, and which may be offered to the trade at a low initial cost, and with almost negligible requirement of service attention.

Yet another object of the invention is realized in an oscillating bed assembly which, despite provisions for a universal angular movement of the bed, within limits, is nevertheless entirely devoid of personal hazards; which is easily accessible from both sides and the ends of the bed proper, as for changing of bed linens, nursing assistance to invalids and similar requirements.

A further and highly advantageous objective of the present improvements is realized in a compact self-contained power unit which may be readily assembled to and removed from the

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bed as such, as for shipping, service attention when required, and the like.

An additional advantageous feature of the present improvements is found in an improved articulate structure of bed proper according to which the bed is constructed of pivotally connected sections susceptible of being varied as to their mutual angular relations, thus enabling the occupant of the bed to utilize it for normal sleeping purposes, or after the manner of an adjustable reclining chair, and requiring only a substantially effortless manipulation, by reason of counterpoising provisions in connections between the parts of the bed proper.

The foregoing and numerous other objects of the invention will more clearly appear as the description proceeds, particularly when considered in connection with the accompanying drawing, in which:

Fig. 1 is a side elevation of a bed assembly embodying the present improvements;

Fig. 2 is an end elevation of the bed assembly;

Fig. 3 is a somewhat enlarged side elevation of the bed proper with certain appurtenant parts, and with other parts broken away for clearness of illustration;

Fig. 4 is a single line angle diagram illustrating a partial degree of angular variation between the sections of the bed proper;

Fig. 5 is an enlarged vertical sectional elevation showing certain parts of the actuating mechanism for oscillating the bed;

Fig. 6 is a side elevation, partly in section, of means for counterbalancing the actuation of the sections of the bed proper, for varying their angularity;

Fig. 7 is an enlarged vertical sectional view illustrating one form of electrical connection between the lead-in wires and an electric motor when power provisions of this type are employed for oscillating the bed;

Fig. 8 is a side elevation of a somewhat modified form of the bed assembly;

Fig. 9 is a view in the nature of a transverse section taken along line 9—9 of Fig. 8, showing a provision for manual actuation of the bed frame;

Fig. 10 is a fragmentary side elevation taken in a zone intermediate the lower position of the assembly and showing the inner ends of a pair of strut or prop elements;

Fig. 11 is an enlarged fragmentary detail, showing the structure for rolling engagement between the rockers and the cradle, particularly as viewed along line 11—11 of Fig. 8;

Fig. 12 is a fragmentary elevation, partly in section, of a hold-down roller forming part of the cradle;

Fig 13 is a fragmentary elevation showing a pivoted connection between each of the strut elements of Fig. 8, and the rocker frame;

Fig. 14 is a transverse section taken along line 14—14 of Fig. 8, showing a pendular guard assembly for one margin of the bed;

Fig. 15 is a line diagram illustrating the action, in extremes of movement, of the guard assembly of Fig. 14;

Fig. 16 is an enlarged detail of a pivot assembly for the guard, particularly as taken along line 16—16 of Fig. 14;

Fig. 17 is a transverse sectional view considerably enlarged, of a roller assembly, taken along line 17—17 of Fig. 8;

Fig. 18 is an enlarged fragmentary elevational view of the hollow shaft employed in and with the power actuating unit of Figs. 1 and 5, and

Fig. 19 is a fragmentary sectional elevation of a latch and actuating device therefor, utilized for selective retention of the bed proper in a horizontal position or linear relation of its articulated sections, this figure being taken along line 19—19 of Fig. 8.

By way of expression of purposes and fields of usage, the improvements to be described are applicable to any of numerous tiltable supports, such as a bed, the examples disclosed being for brevity limited to beds for personal usage.

Referring now by characters of reference to the first sheet of drawing, the bed proper, hereinafter described in more detail, is supported within a normally horizontal, preferably rectangular metal framework consisting of a pair of side elements 10 and 11 which, if formed of metal tubing, may be continued into transverse end elements 12 and 13. Bridging the side elements 10 and 11 is a structure consisting of a pair of headed studs 14 and 15 extended through suitable apertures therefor, transversely through the members 10 and 11. They are rotatably fitted into the side elements. This bridge structure is continued through angle elements 16 and 17 and the latter in turn being bridged by a plate or bar 18 to and through which is secured, as by welding, an actuating arm 20 for a purpose hereinafter more fully to be described.

The bed frame as described and formed of tubular stock, is generally indicated at 21, serves to contain the bed proper, and the latter consists, in the example shown, of three pivotally connected panels or sections each rectangular, formed of metal such as angle stock, and including a back supporting portion 22, being in the form of a rectangular metal frame formed of angular channel stock. To the section 22 is pivoted as through a transverse pivot bolt 23, a seat supporting portion 24, also rectangular and similar in construction to section 22. A third such panel or section is indicated at 25 and serves normally as a leg supporting portion for the occupant, when in reclining position. A pivot bolt 26 articulately connects the sections 24 and 25, similarly to the bolt 23, so that the sections 22, 24 and 25 may assume the various required angular relations for individual comfort of the bed occupant at any time. Secured as by welding, to the inner end of the back supporting portion 22, is an extension arm 27; similarly secured to the leg section and of even length with the arm 27, is an arm 30, while between the arms 27 and 30 is a link 31 to which is attached an

adjusting handle 32, the link 31 being pivoted as at 33 to arm 30, and at 34 to arm 27. Connection of the bed proper consisting of panels or sections 22, 24 and 25 to the bed frame members 10 and 11, is accomplished by extending at least certain of the pivot bolts through the members 10 and 11. Due to the high factor of safety of these through connections, one such connection is in fact sufficient, and is indicated at 14 and 15 (Figs. 3 and 5).

A comparison of Figs. 3 and 4, the latter being only diagrammatic in nature, will reveal the facility for varying the angularity of the sections 22, 24 and 25. The parallelogram linkage 27, 30 and 31, serves to maintain the portions 25 and 22 virtually parallel within the range of their adjustment, and each at equal but opposite angularity with respect to the seat portion 24. The arrangement is thought to be sufficiently graphically portrayed by Fig. 4.

As a convenient and advantageous arrangement for exerting a counterpoise effect on the bed frame proper, the back section 22 thereof is provided with a depending spring abutment arm 35, a similar, spaced spring abutment arm being provided as shown at 36, depending from the seat section 24. Between these abutments is disposed a coil compression spring 37, together with a spring abutment plate, and a screw 38 provided outwardly beyond the abutment 35 with a hand wheel for adjustment of effective spring loading. It will appear that the loading of spring 37 is such as to tend to cause the back, seat and leg supporting elements of the bed to assume an angulate relation as shown by the diagram of Fig. 4. This effect, variable through adjustment of the screw 38 according to weight and size of the patient, is opposed by the weight of the patient, thus minimizing the manual effort otherwise required for adjustment of the panels of the bed to various angular positions, and in many cases obviating the need for nursing attention for this purpose.

Referring now to one manner of support of the bed frame 21 and bed therein, Fig. 1 shows this subassembly supported in a pendulous manner from an outer frame later to be described. The aforesaid support is derived from a pair of vertical elements 41 and 42, each welded or otherwise secured to a zone intermediate one of the end portions 12—13 of the frame 21. Each of these arms 41 and 42 is characterized by an integral, outturned pivot-forming portion such as 43 on the arm 41, and 44 on the arm 42. Embracing respectively the horizontal extensions 43 and 44, are a pair of bearing elements 45 for the member 43, and 46 for the member 44. These journal structures are secured as by welding them in assembly, to a supporting structure or outer frame, now to be described.

The outer frame, shown as a rockable support, is adapted to engage a horizontal subjacent surface such as a floor. This rocker frame, generally indicated at 50, includes a pair of parallel, rather widely spaced rocker members 51 and 52 formed of a metal stock shown as tubular, the rocker portions of which are bent to an arcuate conformity, as will best appear from Fig. 1. The paired rocker-forming portions, each normally disposed in a vertical plane, may be made as parts of a unitary structure, the upper or outer ends of the rocker assemblies being formed to extend horizontally and transversely of the structure at or near its upper portion to form a pair of connecting or bridging pieces 53 and 54, in-

termediate of which are secured as by welding, the journal elements 46 and 45 heretofore mentioned as pivotally receiving the horizontal extensions 43 and 44. Auxiliary cross braces 53A and 54A are provided for added strength and rigidity of the frame.

It will now have appeared that the bed assembly, which for present description of bed position may be considered as the normally horizontal, rectangular frame 21, formed of elements 10, 11, 12, 13, is so supported that it may swing about an axis coincident with the horizontal elements 43 and 44, and be oscillated or rocked in planes transverse to the longitudinal axis of the bed structure. Furthermore, it will now have appeared that the assembly, including elements 51 and 52, is susceptible of a rocking or oscillating motion, in an end-to-end direction or substantially about an axis crosswise of or transverse to the bed proper.

While various mechanism may be employed for imparting the described motion to the structure by manual effort, either by the occupant or by some one located externally of the bed assembly, a health bed for recuperation purposes will usually include a power unit for the purpose of effecting the bed motion most suitable to individual requirements. One example of a suitable power arrangement includes the depending rod, or moment arm 20 heretofore referred to. This element may be provided with an enlarged head at the upper end, as shown, and the arm extended through a suitable aperture therefor in the plate 18 to which the head may be welded. A tubular element may be employed for this arm, with advantages hereinafter appearing, in which case it is provided with a wire port 55 for lead-in conductors. The lower end of element 20 is provided with an enlarged head 56 through which is continued a bore 57 extending through all or at least a part of the member 20. Revolvably supported by the arm 20 is a rotatable power element in the form of a quill or hollow shaft 58 located just above a disc or wheel member 60, the latter being angularly fixed with respect to the arm 20 and head 56, and so is non-rotatable with respect thereto. The wheel or disc 60 may be secured as by welding, to the head 56. The power shaft or quill 58 is provided on one side and near its lower extremity, with a threaded arm 61 extending through a suitable bore 62 therefor, in a counterweight 63. Provision is made for adjustment of either the effective additive loading or tare effect provided by the counterweight, by varying its position on arm 61, through a plurality of adjusting nuts, two of which, indicated at 64 and 65, serve as a primary adjusting nut and jamb nut respectively, and a rear nut 66 coacting with these in maintaining the counterweight 63 in predetermined setting along the arm 61.

Extended from the opposite side of and secured to the quill shaft 58, is a relatively heavy resilient arm 67 formed of a tempered steel stock or the like, and serving as a support for the frame of a motor 70. Usually built into the frame of motor 70 is a reduction gear unit 71 the power output element of which consists of a rotatable shaft 72 carrying a friction wheel 73, this latter working upon a peripheral portion of the wheel or disc 60. The relation and position of the arm 67 are such that the spring support for the unit 70 and 71 provides a downward bias, serving to maintain a desirable frictional driving relation between the friction wheel 73 which may

be formed of fiber or other composition, and the element 60 which it operatively engages.

It will now have appeared that the motor and counterweight are revolvable about arm 20, and that with these elements on opposite sides of the arm, the useful counterpoise effect is a differential one. In some cases it is desirable to have an additive relation of these masses, as by bringing these elements on the same side of arm 20. An arrangement for such an adjustment is best shown by Fig. 18, wherein the power sleeve or shaft is formed of two interfitting aligned elements, susceptible of relative angular adjustment. An upper element 58A, is provided with projections on its lower periphery, interengaging selective ones of corresponding recesses on a lower element 58B, the mating ends of the sleeve parts being shown as castellated in form. A set collar 59 (Fig. 18) normally secured to arm 20, may be released and lifted to enable separation and reengagement of elements 58A and 58B after the arms 61 and 67 are brought into the desired angular relation.

As a practical convenience in energizing the motor 70, and to avoid twisting and wrapping of the lead-in conductors to the motor, there is provided a slip ring unit shown in section by Fig. 7, and which is described as follows in reference to the illustrated example:

The head 56 which is of substantial depth, and secured to or forming a part of the arm 20, is provided with a continuation of bore 57 and is initially open at its lower end. The head 56 is provided with external threads 77 (see Fig. 7) which serve in assembly to enable attachment thereto, of an internally threaded collar 80, this collar being provided with an inset flange 81. Seated within collar 80 is an insulating plate 82 formed of a molded plastic material for example, and containing embedded therein, an outer metallic ring 83 and spaced therefrom, an inner metallic ring 84. The plate 82 is centrally apertured as will appear, to receive a pivot bolt 85, supporting in rotatable relation below plate 82, a block 86. The block 86 is provided with depthwise bores and counterbores which receive carbon brushes 87, these being spring-pressed depthwise and upwardly against the rings 83 and 84. Outwardly of the carbon brushes are binding posts 90 to which are secured motor supply conductors 91. Secured to or formed as an integral part of the rotatable block 86, and hollow and formed of insulating material, is an arm 92 extending to motor 70 and serving to carry the conductors 91. The lead-in or supply conductors 93 and 94 are brought downwardly through bore 57, and are soldered or otherwise secured, respectively, in electrical contact with the rings 83 and 84. The arm 92 may be provided with a knuckle 95, this being advantageous to permit a certain variation in position of the motor and drive unit 70—71, since the latter is yieldably supported from the spring arm 67 as described. As a means for quickly assembling and disassembling the rotatable block 86 and the plate 82, and to assist in urging the rotatable assembly against the stationary rings, there is provided a stub shaft or pivot bolt 85 with a nut 96 and thereabove a light compression spring 97 together with a washer 100. It will have appeared that this arrangement provides a sturdy, low cost and reliable slip ring contact arrangement which facilitates assembly of the lead-in conductors to the pickup rings 83 and 84, and serves to keep the rotating brush assembly in a position of

easy access for cleaning and service at any time.

Although for convenience of illustration the supply conductors are shown as entering hollow arm 20 through a wire port 55, it is a preferred production practice to employ a receptacle or socket 98 (Fig. 1) energizable through an extension cord. The conductors 93 and 94 are brought internally of elements 44, 42 thence through one side member of frame 21, thence led into the upper end of bore 57, and therethrough to rings 83 and 84. This arrangement serves, for safety and neatness, to conceal much of the supply wiring.

Certain added facilities making for greatest convenience in use of the bed, particularly for therapeutic purposes, include a provision for preventing as may be desired at times, or by certain patients, lateral swinging oscillation of the bed, as through the pivot arms 43 and 44. A simple provision for this purpose consists in a set screw 101 provided with a wing head for ease of actuation, and threadedly fitting in the journal element 46 to enable application of a variable resistance to swinging movement through engagement of the screw end with part 44.

A further and advantageous facility to stop as may be desired, endwise rocking movement or oscillation of the bed, consists in the provision of a third or intermediate longitudinal member 102 in the frame 50. This member includes a "flat" 103, being an intermediate rectilinear portion which upon engagement with the floor or like surface below the rockers will serve to prevent rocking movement. Additional, similar, linear floor-engaging flats are provided at each end of the flat 103, so as to arrest the longitudinal rocking movement of the bed with either the head or the foot portion tilted up. For retraction, the element 102 is pivoted at its opposite ends, at 104, to the cross members 53A and 54A of the frame. The member 102 thus may be swung to a normal or inoperative position, as shown by Fig. 2, and when brought into a vertical plane, the flat 103 will prevent endwise tilting or rocking movement of the frame 50. The pivots 104 are adjustable by means (not shown) to create a substantial frictional resistance to displacement of the member 102, whereby it will retain any adjusted position unless intentionally displaced therefrom.

It will now have appeared that, assuming the motor 70 to be energized, the entire assembly including these members and the counterweight member 63, will, with the quill 58, be given a rotary movement as a unit about the wheel or disc 60, hence about the arm 20. Due to the variable tare effect of the counterweight 63, the arms 20 and 61 constitute a moment arm serving to subject frame 21 and the bed therein, to a gyratory motion. Due to the gradual displacement of the captive mass 63 which may be augmented or diminished by the mass of the motor-gear assembly 70—71, as these masses are impelled in an orbital manner, it will now have appeared that the effect is, twice per revolution of the power unit to subject the frame 21 to extreme sidewise tilting actuation in opposite directions. Otherwise expressed, it is subject to a periodic swinging movement, about the axis identified with members 43 and 44. Similarly, twice per revolution of the orbitally-actuated assembly 70, 63, the rocking assembly will be subject to extremes of rocking motion in opposite directions longitudinally of the bed. The speed of this actuation may be varied through suitable control of element 71, or by control of speed of motor 70, and the amplitude of the gyratory motion may be varied by selective adjustments of the member 63 along the threaded supporting arm or rod 61, and further by varying the angular relation between the counterweight and motor in the manner described.

In the somewhat modified form of the bed assembly shown by Fig. 8, the major elements of structure are or may be virtually the same as heretofore described, with minor changes and certain additional accessories. For comparison of structural differences, it is noted that this form includes a rockable frame generally indicated at 120, including rockers 121 and 122 continued into upper bridge elements 123 and 124. The frame 120 supports the tubular side rocking frame generally indicated at 125, in a manner which may be identical with the relation of frame 21 to frame 50, heretofore described. While the structure of Fig. 8 may be power driven, for example in the same manner as the structure of Fig. 1, it is shown as arranged for manual actuation to effect either or both a lateral swinging movement of the frame 125, and therewith the bed, and an endwise rocking movement thereof. The inner bed-supporting frame may, similarly to the frame 22, 24, 25 of Fig. 3, be formed to include pivotally related back, seat and leg engaging sections. These are omitted from Fig. 8, but may be assumed as identical with the arrangement earlier described. In the modification, paired, spaced, depending arms 126 and 127 serve through an adjusting screw, to coact with a compression spring 130 analogous in purpose, and which may be identical in structure to the spring 37 heretofore described.

The drive arrangement of Fig. 8 includes a fixed central depending arm 131 by which is supported for rotation a hollow power or quill shaft 132, the latter being journalled on the arm 131. Extended from and secured to the element 132 is a counterweight-supporting arm 133 carrying a counterpoise 134 adjustably mounted thereon. A guide arm 135 extends through an additional bore 137 parallel to a principal bore 140 in weight 134. In this construction the power member 132 carries at its upper end a bevel gear 141 meshing with a similar gear or pinion 142, the latter being secured to a rotatable shaft 143. The latter is journalled in suitable bearing arms 144 and 145 assembled, as by welding, to a bar or plate 146 bridging one of the sections of the bed proper, for example, the seat section thereof, indicated at 24A (Fig. 9), it being noted that the sections of the articulated bed frame proper in the modified forms of assembly are identical with, or correspond to, the sections 22, 24 and 25 of Figs. 1 and 3.

As a convenient means for manual actuation, shaft 143 is provided with a hand wheel located in a position of convenient access to an occupant of the bed. From the earlier description of the operation of the motor powered unit, it will now appear that rotation of shaft 143 and therewith, through the bevel gears, the hollow power shaft, quill or sleeve 132, serves to impart an orbital movement to the counterweight 134. In a manner earlier described such movement of the counterweight will effect either or both as desired, a side rocking movement of the bed frame 125 and a longitudinal rocking movement thereof through the action of the assembly 120, whether on the cradle or directly engaging a floor surface. It will have appeared that, assuming arm 131 to be

rigidly secured, as to the intermediate or seat section of the bed proper, when the counterweight 134 is brought to a position directly opposite that shown by Fig. 8, or directly opposite that of the weight 63 in Fig. 1, the counterweight will be in a relatively elevated position and thus will tend markedly to bias the seat, leg and back portions of the articulated bed structure, into an extreme angulate relation. Such articulate actuation of the bed sections will occur whether the manually powered or electrically driven unit be employed for actuation of the assembly.

A still further advantageous feature of the assembly in its most complete and advanced form, consists in the provision of a rectangular frame generally indicated at 110 (Fig. 8), which with appurtenances to be described, constitutes a cradle may serve as a rolling support for any of the rocking structures herein described, although shown on the bed assembly of Fig. 8, later referred to in detail. Carried by the opposite side elements of the frame 110, are a plurality of vertically extending arms 111, each of the arms 111 being apertured at its upper end, for the reception of a pivot pin serving a peripherally grooved roller 112, the pivot elements being indicated at 113. A hold-down provision sometimes desirable, consists of a pair of rollers, preferably cylindrical as shown, and indicated at 114, one of which is engageable with the inner arcuate surface of each rocker. The rollers 114 are each carried by a headed pivot pin 115 (Fig. 12), the latter being fixed into the outer end of a bracket arm 116, the inner or lower end of which is turned inwardly and preferably of some non-circular section. The side members of the base frame 110 are provided with non-circular apertures 117, thus assuring a vertical position of arm 116, while permitting it to be withdrawn from, or restored to, a position such that roller 114 overlies the rocker.

The manner of use of the cradle when employed according to user's preference, will be evident from Fig. 8, from which it will appear that frame 110 occupies an intermediate position beneath the rocking frame in such manner that each longitudinally aligned pair of rollers 112 occupies a fixed position, and that the rollers of each pair engage longitudinally spaced zones of one of the rockers. It is highly desirable that the rollers and rockers be so formed as to provide means for maintaining alignment of the rocker frame on the cradle. This is accomplished in simple manner in the present example by selecting rollers 112 which are peripherally grooved in substantially semi-circular section, with the grooves of a diameter to accommodate with easy working clearances, the tubular sections of the rockers. It will now have appeared that when the cradle is positioned for use beneath the rockers of the frame, this frame is prevented from creeping, as might sometimes otherwise occur on floor coverings of certain types; further, there is obviated any difficulty sometimes otherwise noted, in a tendency of the rockers to groove a soft flooring material, such as wood or carpeting. The position of the bed assembly is thus definitely fixed, and frictional resistance to its rocking movement distinctly minimized by use of the cradle.

A further added convenience for many kinds of service consists in the provision of means for maintaining the bed assembly longitudinally tilted, for example, to keep the head of a patient at maximum elevation with feet lowered, or in certain other cases, to accomplish an opposite effect. For these purposes there are provided props or struts indicated respectively at 160 and 161. These are shown as arcuate elements formed of metal tubing which may be similar to the stock employed in construction of the other parts of the frame 120. In retracted or inoperative position the elements 160 and 161 occupy substantially the relation of an intermediate or third rocker, extending in a longitudinal vertical median plane of the assembly, although kept free of the floor or other subjacent support. Each of the prop or strut elements 160—161 may conveniently be pivoted, as through a tubular transverse head portion 162 surrounding and pivoted upon, in the case of prop 161, the cross element 124 of the frame 120. A coiled torsion spring 163 (Fig. 13) has one of its tangs extended through an aperture into the tubing of member 124 and an opposite tang secured to the prop or arm 161 in a manner normally tending to bias the spring loaded member inwardly toward the center of the bed. An identical but oppositely biased retracting spring is employed between elements 160 and 123. The free ends of each of members 160—161 are each cut at a distinct angle to the arcuate axis of each of these strut elements, so as to provide a planar bearing with the floor therebelow. When the ends are brought together, as in retracted position of both props or struts, they will be related substantially as shown by Fig. 10. So as to enhance frictional engagement with the floor or other similar support and to avoid marring effects, the biased free end of each of the strut elements is provided with a composition cap or tip as indicated at 164.

The manner of usage of the elements 160 or 161, these being employed separately and individually, may be described as follows: Assuming for example that it be desired to elevate the head end of the bed assembly (adjacent prop 161) as far as possible, the bed will first be rocked to an extreme position such that the head end is given its maximum elevation. It then becomes possible with little manual effort, to bring the arm 161 outwardly beyond the normal confines of the frame, to a position such that its tip 164 flatly engages the floor therebeneath. Thereupon it will, now obviously, be impossible to rock the bed in a fore-and-aft direction. This is sometimes desirable when with proper adjustment of the articulated bed frame, it is brought to serve the purpose and position of parts of a chair-like structure. The opposite or foot end of the assembly may, assuming the retraction of prop or arm 161, be brought outwardly in the same manner so as to elevate the foot end of the bed. These arms may be employed irrespective of whether the frame 120 be mounted for rocking directly upon the floor, or upon the cradle rolls 112.

A further optional provision yet a valuable accessory for maintaining a condition of balance between the several parts of the bed frame, and to compensate for weight differentials between the head, body and legs of various patients, consists of a slidable counterweight 230, adjustable along a supporting and guide rod 231 (Fig. 8) carried by depending brackets below the bed proper. Adjustments are maintained by a set screw 232. This provision enables the oscillation of the bed in longitudinal directions, to be kept uniform in spite of varying loadings of the articulated bed sections, the weight 230 serving after the manner of a tare poise.

Since by virtue of the spring 37 and slidable poise 230 the sections of bed 21 may be in a deli-

cate condition of balance, it is sometimes desirable to lock or latch these sections in horizontal, aligned relation. A suitable provision for this purpose is best shown by Fig. 19, wherein a latch-pin **233** is slidably carried in an open end tube **234** mounted diametrally of one of the side members of a frame **125** (Fig. 8), later described in more detail. A small compression spring **235** acts normally to extend the latch pin into an opening **236** in one of the side channel members, such as **22** or **22A**, of the bed proper. A convenient agency for release of pin **233** consists of a slidable sleeve **237** movable along the tubular frame, and provided with a sloped, forked camming surface **238**. As the sleeve **237** is moved to bring the camming surface beneath a collar **240**, forming on outer spring abutment, the effect is to withdraw the pin **233** from opening **236**. So long as the bed frame and frame **125** are kept in coplanar relation by the pin **233**, there is prevented any casual or unintended disturbance of the relation of the sections of the bed proper. Although the provision of poise **230** and latch pin **233** is illustrated on a modified form of bed, as shown by Fig. 8, it should be distinctly indicated that these features are equally intended for usage in and on the bed assembly of Figs. 1 and 2.

Hospital experience indicates a frequent desirability of provisions to move the patient from place to place, as is usually done by transfer to a wheel chair or the like. This result may be attained by an occupant of the present bed assembly through a set of retractible wheels or rollers. When the structure is employed as a rocking frame support, such rolls are in an out-of-action position, but when desired to transport the patient from place to place the rollers may readily be brought to a position on the rocking frame such that it can serve as a wheel chair or carriage. One practical and simple provision for this purpose is best shown by Figs. 8 and 17. Each of the rockers **121** and **122** carries a pair of clamps **170**, each clamp embracing the adjacent portion of the rocker. Each such clamp is in the nature of a contractile band, with upstanding apertured ears **171**, the apertures of which are traversed by a headed clamp screw **172**. Secured as by welding to opposite sides of the clamp band **170**, are a pair of pins or stub shafts **173** on each of which is journalled a wheel or roller **174**, provided with a resilient tire **175**. Thus the rollers are paired, with four such pairs being contemplated, but without restriction as to number.

It will now be obvious that, assuming the frame **120** to be free of its cradle, release of screws **172** will enable the elements **170** to be slidably brought down to positions such that wheels **174** will contact the floor, one pair forwardly and another pair rearwardly of the center of each rocker. When screws **172** are again tightened, the rollers will remain in operative position for wheeling the bed assembly from place to place.

A further function of the roller assemblies, whether or not the frame **120** be mounted on the cradle, is to prevent, as may at times be desired, the fore-and-aft rocking movement of the frame. This may readily be accomplished by bringing the paired roller assemblies from the inoperative or retracted positions shown by Fig. 8, downwardly to positions such that they engage the floor at spaced points, or engage the rollers **112** of the cradle.

An additional highly useful provision in a tiltable or oscillating bed structure, is shown applied to the assembly of Fig. 8, and its operation and details of structure best revealed by Figs. 14, 15 and 16. This feature consists of a marginal guard adapted to be brought, when desired, into a position just above but close to the lower side of the bed when tilted. This feature may be applied to any selected margin of the bed, but is illustrated in its most useful location, namely, in certain zones along the lateral bed margins. One or more guard plates **180**, two of which are shown as a connected pair in Fig. 14, are each secured as by welding to one or more curved arms **181**, the latter each being extended to form pivot arms **182**. Each such arm is pivoted at **183** to an apertured ear or pair thereof, on one of the side angle elements of the bed frame proper, an identical but opposite arrangement being located on the opposite rails of the bed. The pivot arms are pivotally connected to respective extensions of a link or rod **185**. Rod **185** is characterized by substantial weight or mass, and is capable of a lateral shifting movement along its axis in a direction transverse of the bed, being guidedly constrained to such motion by a pair of loop or eye members **186**. It will thus appear that the guards **180** are, in effect, mounted as inverted pendulums, but are coupled for movement in unison relative to the bed proper. In Fig. 14 the bed is shown in a neutral position, i. e. intermediate each extreme of side tilting oscillation. The manner of actuation of the guards **180** in the respective extremes of movement of each side of the bed, is graphically shown by the line diagram of Fig. 15, from which it will appear that the guard on the high side of the bed attains an extreme retracted position, whereas that on the currently lower side of the bed, will be brought by pendular action of mass **185**, to its operative position nearest the patient, so as to preclude any possibility of personal injury by falling.

In order to facilitate certain special treatments of the patient it is sometimes advisable to lock or block the guard elements in fixed position. This effect may be automatically attained when either of the paired guards **180** is brought to operative position by a pendulum cam **187**, supported to swing below the link **185**. It will now appear that the upper portion or camming surface of member **187** will, when the bed is tilted in either extreme lateral position, frictionally engage the link **185** and thus retain it and the guards with one thereof in operative position on the low side of the bed until the weighted cam is again released by restoration of the bed to a level or horizontal position.

It will have appeared that the assembly as described either with or without the various auxiliary structures and refinements described, offers a variety of advantages in use for its intended purpose, and that it will serve fully to attain the several objects above expressed, and others implied from the description of parts and operation.

Although the invention has been described by making explicit reference to the several elements and features of but a few selected examples, the detail of description is to be understood solely in an instructive rather than in any limiting sense, because of the many variants possible within the scope of the claims hereunto appended.

I claim as my invention:

1. In a health bed assembly, a bed including connected portions, viz., a back-supporting portion, a seat-supporting portion and a leg-supporting portion, a tiltable primary support for the said seat portion comprised of a rigid frame

about all of said portions, pivot elements transversely of said frame, and engaging the seat portion, pivotal connections between the back and seat portions and additional such connections between the seat and leg portions, a lever arm carried by the back-supporting portion and a second such arm carried by the leg-supporting portion, a link pivotally connecting said portions, counterbalancing means associated with one of said portions, and means for adjusting the effective loading of said counterbalancing means.

2. In rockable structure for therapeutic use, a supporting frame for the patient, the frame provided with spaced parallel rockers, a weight captively attached for orbital movement thereof beneath the frame, means for moving said weight in its orbit, and a cradle for the frame, the cradle including a base and a plurality of rollers carried by and extended upwardly of the base, said rollers being rotatively engaged by spaced zones of the rockers, the rollers and rockers being formed to provide means maintaining their mutual alignment.

3. In a device of the general type described, including a tiltable bed, an arm extended from the bed as an actuating element for causing tilting movement of the bed, a power unit supported from the arm, and including a motor, a counterweight, means rotatably supporting the counterweight and motor from said arm, and a driving connection between the motor and the arm including a motor driven wheel and a track angularly fixed with respect to said arm and engaged by said driving wheel.

4. The combination and arrangement of elements as recited by claim 3, but further characterized by the inclusion of a two-part rotatable sleeve element movable about the arm, the counterweight and motor being carried respectively by spaced parts or portions of said sleeve element, said portions being relatively angularly displaceable, and means including said portions of the sleeve element for varying their relative angular positions, whereby to enable variations in relative angular positions of the counterweight and the motor.

5. In a bed assembly, bed portions supported for oscillating movement, an arm pendularly affixed to an oscillating portion of the bed assembly, a sleeve rotatable about said arm, a second arm carried by and projecting outwardly of said sleeve, a counterweight carried by said second arm, a rotatable bed-actuating member located in a position for access by an occupant of the bed, and drive connections from said actuating member to said sleeve.

6. In a rockable bed assembly, a bed frame, a pair of rocker elements formed as parts of a frame for the bed assembly, and an auxiliary support pivotally connected to the assembly frame and arranged for swinging movement to a position such that said support will engage a surface such as a floor subjacent to the frame, and in such position, prevent rocking movement of the bed, said auxiliary support formed to provide a plurality of angularly related, linear, floor-engaging surfaces selectively positionable with the floor or like surface to restrain the bed in any of a plurality of different angular positions.

7. In a rockable structure of the general class described, a frame formed for rocking movement and including a pair of spaced rocker elements, cross connections between the ends of the rocker elements, and a pair of arcuate supports pivotally connected to said cross connections, and variably positionable in a plane longitudinally of the bed assembly, the said supports serving selectively as props each adapted to fix the angularity of the bed frame in one extreme of its oscillating or rocking movement, and spring means associated with said supports and tending to bias them to normally retracted or inoperative positions.

8. In a rockable bed structure, a bed frame, a guard member adapted to project upwardly of, and being pivotally mounted on the bed frame, means forming with the guard and pivotal mounting thereof a pendular structure, serving to effect a pivotal actuation of the guard structure into operative position when the guarded portion of the bed margin is in a relatively lowered position, and pendular means coacting with the said pendulum structure, to retain the guard member in operative position when the bed frame is tilted or rocked near one extreme position thereof.

9. In a bed assembly, a bed frame including a back section, a seat section and a section normally adjacent the legs of an occupant of the bed, said sections being pivotally connected, a pivoted linkage connecting certain of said sections to maintain them in predetermined relative angular relations, an arm depending from the seat section, and a counterweight carried by and orbitally movable about the arm, the counterweight and arm being so arranged as to tend, in certain orbital positions of the weight, to bias the bed sections into a more angulate mutual relation.

10. In a bed structure for therapeutic purposes, a bed frame, rocker means below and connected to the frame, the frame and rockers being so formed and connected that the frame may receive oscillating movements both lengthwise and crosswise of the bed, a rolling support below and upon which the rocker means may oscillate, and a mass supported for an orbital movement by the bed frame, said mass being arranged upon movement into different portions of its orbit, to shift the center of gravity of the bed assembly including said mass, both transversely and longitudinally of the bed frame, whereby to impart a compound oscillating movement to the bed frame.

11. In a bed assembly of the general type and for the general purposes described, a bed frame, a plurality of rockers disposed below and connected to the frame, the frame and rockers being so formed and connected that the bed may receive a movement of oscillatory character in directions both lengthwise and transversely of the bed frame, and a mass together with a prime mover therefor, supported by the bed frame and capable of an orbital movement below said frame, said mass being arranged upon its actuation by said prime mover, to impart to the bed frame with the aid of said rockers, a succession of tilting movements of alternately longitudinal and transverse character, in respect to the bed frame.

12. In a bed structure for therapeutic purposes, a bed comprised of a plurality of sections jointed to permit their assumption of varying relative angularity, a support for the sections of the bed, counterbalancing means serving the sections of the bed, a rotary power element and driving connections from the power element to the counterbalancing means, thence to at least one of said sections, the power unit and connections serving with the counterbalancing means to vary the relative angularity of the sections as the power unit is operated.

13. In a therapeutic bed assembly, a bed frame, structure supporting and establishing a path of

permissive tilting movement of the bed frame in any direction, frame-tilting mechanism including a mass captively connected to, and located below the frame for movement in a predetermined curvilinear orbit with respect thereto, and a power unit so connected to said mass as to impel the mass to different positions within its orbit, and thus to result in tilting actuation of the frame, in directions and to an extent as determined by the orbit of movement of said mass.

14. In a bed assembly, a bed frame, a plurality of rockers disposed below and connected to the frame, a plurality of jointed bed sections supported by and pivoted to the frame so as to be capable of various relative angular positions within the frame, the frame, rockers and sections being so connected that each may receive a rocking movement both lengthwise and transversely of the bed frame, a power-actuated, orbitally movable mass supported below the bed frame, means for actuating said mass within its orbit, and connections from said mass to one of said bed sections, said mass when actuated, serving to impart through said connections to the sections an articulate actuation, and thence through the sections to the frame in coaction with said rockers, a succession of longitudinal and transverse tilting movements, and a control device selectively positionable to arrest said longitudinal tilting movements and thus acting to augment the effect of movement of said mass in causing an articulate motion of the several jointed sections.

15. In a rockable bed assembly, a bed frame, a plurality of pivotally related bed sections pivotally connected to the frame, rocker means below and connected to the frame, the frame, rocker means and sections being so formed and connected as to receive rocking movements both lengthwise and crosswise of the bed, a rolling support below and upon which the rocker means can operate, and an orbitally movable mass, including a motor and connected reduction gear, supported by and below one of said bed sections, said mass being arranged upon movement into different portions of its orbit, to shift the center of gravity of the bed assembly both transversely and longitudinally of the bed frame, whereby to impart a compound rocking movement to the bed frame coupled with an articulate actuation of the several bed sections within the frame.

16. In a bed assembly, a plurality of pivotally connected bed sections, a bed frame within which the sections are pivotally mounted in a manner such that the sections may assume different relative angularity within the bed frame, support means below and connected to the frame, and of a character such that the bed frame may be tilted both lengthwise and crosswise, the frame and sections being so connected that the sections are articulately movable with respect to each other and to the frame in assuming varying angularity, and that both frame and sections may receive tilting movements in directions both lengthwise and crosswise of the bed frame, and a power driven unit of substantial mass supported for orbital movement below the bed frame, said unit being arranged upon movement into different portions of its orbit, to shift the center of gravity of the bed assembly both transversely and longitudinally of the bed frame, whereby to impart a compound tilting movement to the bed frame and sections upon said support means and an articulate actuation of the bed sections.

17. In a health bed assembly, a bed unit comprised of a plurality of sections pivotally connected to permit of their articulate movement into positions of varying relative angularity, a frame unit supporting the bed unit, spaced supports for the frame unit, to which the frame unit is pivotally connected, and power means operatively connected to one of said units, the last said one unit coacting with the power means to effect a tilting motion of both units.

18. In a health bed assembly, a bed unit comprised of a plurality of jointed sections, pivot elements located transversely of the bed unit, through which the sections are pivotally related to permit of their articulate movement about axes transverse to the bed assembly, into positions of varying relative angularity, a tiltable frame unit supporting the bed unit, both said units being thus tiltable together, a guard along one side of and pivotally carried by the frame unit, supporting means for the frame unit with respect to which the frame unit is tiltable, and power means operatively connected to one of said units, and coacting therewith to effect a cyclic tilting movement of both units and a pivotal movement of said guard between operative and inoperative positions with respect to the bed unit.

19. In a health bed assembly, a bed frame, a support for the frame, comprising a base formed of rockers laterally of the bed frame, and bridge members connecting the opposite ends of the rockers, elements pendulously supporting the bed frame from the bridge members, a rotatable power shaft, an orbitally movable mass captively supported from the frame for movement by the power shaft, and operative connections between the power shaft and the frame and coacting with the movable mass so as to impart to the frame a compound movement consisting of actuation about an axis of rocking movement of the support, substantially along the bed frame, and movement of the bed frame across the support as the power shaft is rotated.

20. In a health bed assembly, a bed frame, a rockable structure supporting the frame, including pendulos supports for opposite end portions of the frame, said structure and supports establishing a path of oscillation of the frame, a rotatable power shaft, an orbitally movable mass impelled by said shaft, and an operative connection between the power shaft and the frame, and coacting with said movable mass for communicating to the frame. a rocking movement about an axis across the frame.

21. In a health bed assembly, a bed frame, a support for the frame so formed as rockingly to engage a subjacent surface such as a floor, pair of rockers arranged longitudinally of the the bed frame being pivotally carried by the rockable support, the latter including a spaced bed frame at the sides thereof, a power shaft, means providing an operative connection therefrom to the bed frame for rocking the frame, the power shaft and connection being disposed below the bed frame and between said pair of rockers, and a pair of retractable wheel units carried by each said rocker, and positionable to arrest rocker actuation.

22. In a health bed, a substantially rectangular frame within which the supporting portions of the bed are assembled, a second frame assembled to the first frame, the two frames being so pivotally connected together that the first said frame may oscillate within the second, the second said frame being so supported that it may be given an

oscillatory or rocking movement, and means including a power shaft and elements operatively connecting same to the first said frame, and acting therethrough to impart a rocking movement to both frames.

23. In a bed structure for therapeutic uses, a bed comprised of a plurality of sections, means pivotally connecting adjacent sections so they may assume varying relative angularity, a tiltable frame by which the bed is carried, a support pivotally connected to the frame and selectively positionable to engage a floor or like subjacent support and thus to retain the frame and bed in a longitudinally tilted position, and a motor-driven power unit including drive connections from the motor thereof to the sectional bed, said connections embodying an arm having one end operatively connected to one of the bed sections, and its opposite end connected in the power unit to be actuated in an orbital path such that the power unit and connections upon actuation, serve normally to effect a cyclic variation in tilt of both the frame and bed, together with a cyclic variation in relative angularity of the bed sections, and the power unit being further functionally so connected to the bed through said arm that, during such times as said support maintains the head of the bed in an upwardly tilted position, the power unit serves to

augment the normal range of angular displacement of the said bed sections.

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