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W. W. WHITE

3,562,824

HAMMOCK FOR INVALID BEDS

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FIG. 1

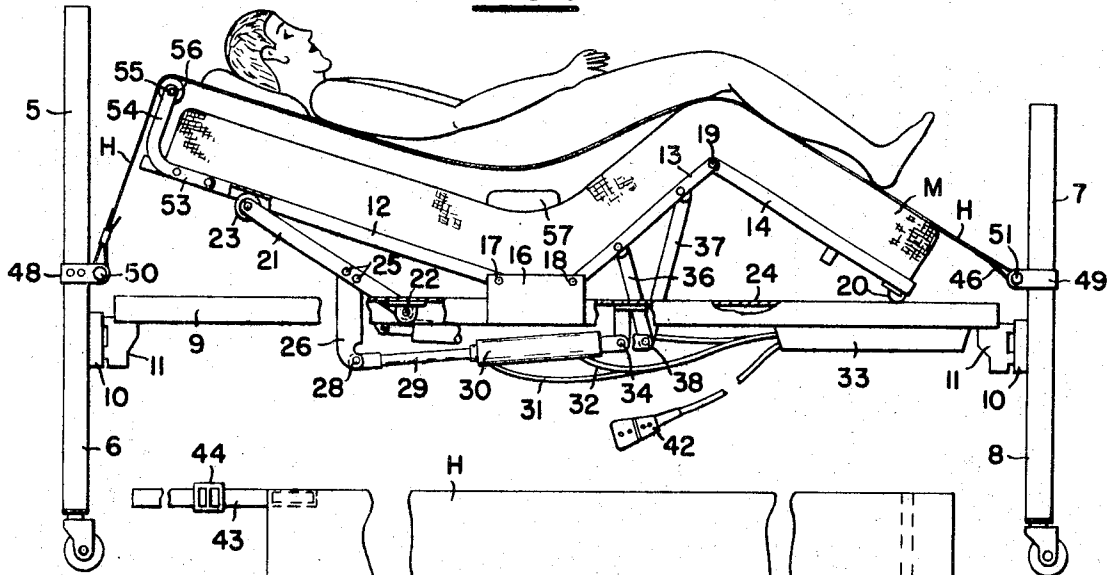


FIG. 2

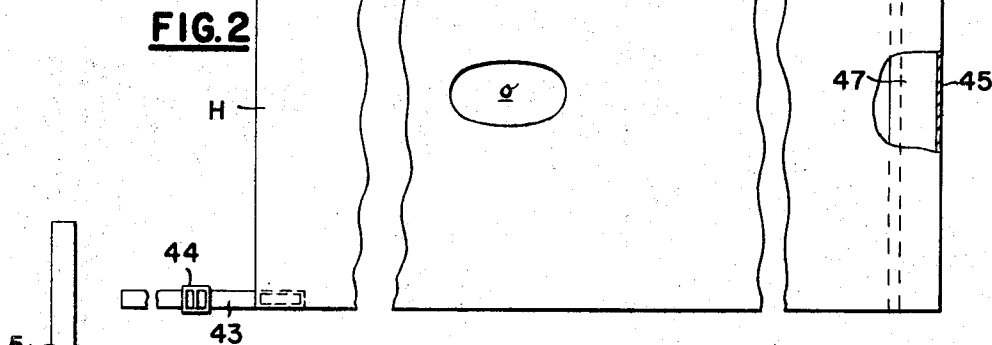


FIG. 3

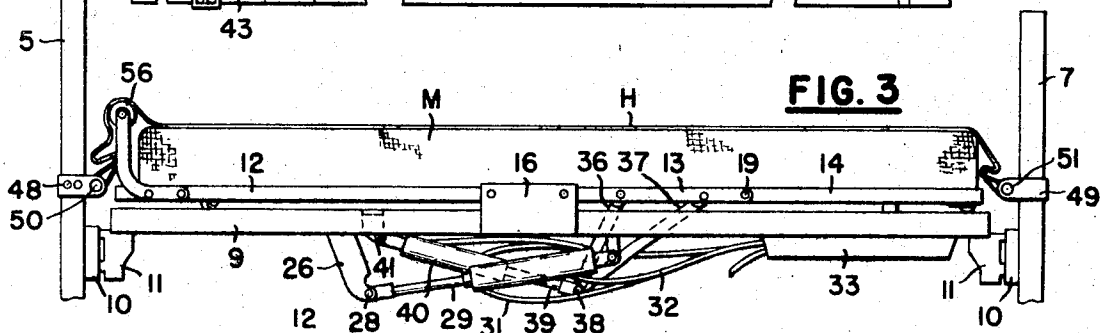
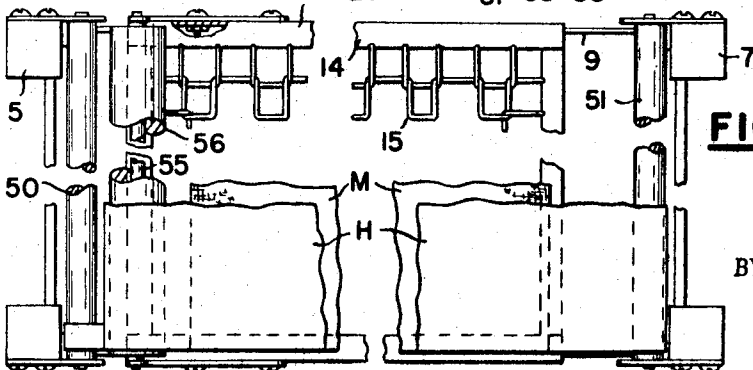


FIG. 4



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HAMMOCK FOR INVALID BEDS
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4 Claims

ABSTRACT OF THE DISCLOSURE

A sheet-like hammock for an invalid bed of the type wherein a flexible mattress is rested upon a jointed supporting frame therefor. This frame which is normally disposed horizontally is adapted to execute certain movements, together with the mattress thereon, whereby the head end of the mattress, also a jointed area toward its foot end, are raised. Two widely spaced suspension points are thereby provided for sustaining the hammock off of the mattress when the hammock ends are anchored to the head and foot units of the bed frame. The space below the hammock, when so raised, suffices for accommodation of a bed pan when rested upon the mattress. An opening in the hammock at a point opposite the bed pan permits the occupant of the bed to freely discharge his body wastes therethrough and into the pan.

This invention relates to a hammock adapted for use with an invalid bed having power means for adjusting certain areas of its mattress to varying elevations, as desired. More particularly, the present invention is concerned with simple and effective means whereby a sheet-like hammock, when fixedly anchored to opposite ends of the bed frame, may be raised, in response to adjusting movements of the mattress at spaced points lengthwise thereof, whereby to suspend the hammock together with a person lying thereon. When so suspended, the patient is in a functional position for discharge of body wastes through an opening in the hammock into a bed pan therebelow rested upon the mattress.

Such a hammock is advantageous for use in hospitals and elsewhere where invalids of many kinds are cared for. It enables each occupant of a bed equipped with such a hammock to shift his position effortlessly and as required whenever the natural function of elimination is to be performed; and to do this without aid of any kind from an attendant who may or may not be available at the time needed. This is accomplished by manipulation of control buttons which operate a switch interposed in electrical circuits leading to and from motors which operate the adjusting mechanisms. Any such upward movement then tends to lift the hammock, when spread over the mattress, together with its suspended patient, to an elevated position which permits a bed pan to be placed on the mattress below an opening in the hammock through which body wastes may then be discharged by the patient. Upon removal of the pan, the patient may then operate the switch controls for a reverse movement of the mattress-adjusting means whereby the mattress is lowered to its normal level position from end to end, permitting the hammock to settle with it. The bed occupant may then continue his rest in a horizontal position through an indefinite period, or re-adjust the mattress and hammock thereon to different positions, as desired.

The means whereby the present hammock is made to operate with each adjustment of the mattress are simple and inexpensive. They include certain hardware by which opposite ends of the hammock are anchored to the bed

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frame, and means carried by the movable mattress supporting-frame for engagement with the under face of the hammock for raising it off the mattress at spaced linear points thereof when the latter are elevated above their normal level. Nothing further is required, making it simple and facile to place a fresh hammock upon the mattress or remove a soiled one therefrom. These and other objects and advantages achieved by this invention will appear hereinafter in the following description, taken in conjunction with the accompanying drawing, wherein:

FIG. 1 is a side elevation of a conventional invalid bed of the type wherein the mattress may be raised or lowered at spaced linear points lengthwise thereof, showing applied thereto the hammock of this invention raised to an elevated position in response to upward movement of the mattress;

FIG. 2 is a plan view of the hammock per se;

FIG. 3 is a view similar to FIG. 1, showing the hammock anchored to opposite ends of the bed and spread smoothly over the mattress which is disposed in its normal horizontal position; and

FIG. 4 is an enlarged fragmentary plan view of the bed, a portion of the hammock and mattress thereof being broken away to expose certain parts which would otherwise be hidden.

The invalid bed illustrated is typical of the type commonly used in hospitals and elsewhere. Its framework comprises a head unit 5 supported between vertical legs 6, a foot unit 7 supported between vertical legs 8, and elongated side rails 9 extending lengthwise of the bed in fixed connection with the upstanding frame units at opposite ends thereof. Mounted upon supporting fixtures 10 affixed to the head and foot units are locking members 11 depending from the corners of a jointed frame comprising a body section 12, a thigh section 13, and a leg section 14. A mattress-supporting spring structure 15 is attached to each of the four sides of the jointed frame which is normally horizontal to support thereon the mattress M in the same position (FIG. 3).

Fixedly secured to each side rail is an upstanding plate 16, each positioned opposite the other at a point intermediately of the bed ends. Each plate furnishes a pivotal mounting at 17 and 18 for the body and thigh sections 12 and 13 of the jointed frame. The leg section 14 is pivotally joined at 19 to the thigh section 13 at its free end. The opposite end of the leg section is equipped with a roller 20 whereby to move toward or from the foot unit 7 of the bed frame. A link 21 extends from the side rail, with which it is pivotally connected at 22, to a point near the head end of the body section 12 where it is equipped with a roller 23 adapted to ride along a flange 24 formed on the body section 12. To this link is connected at 25 one end of an arm 26 depending therefrom to be pivotally joined at 28 to one end of a rod 29 extending slidably from a hydraulic cylinder 30 from which fluid lines 31 and 32 connect with a motor-operated pump (not shown) mounted within a suitable housing 33 therefor. The cylinder closed end is pivotally mounted at 34 to a lug depending from the side rail.

A pair of links 36 and 37 is pivotally joined to the thigh section 13 at spaced points lengthwise thereof, both links extending below the bed frame to connect at 38 with the end of a rod 39 projecting from one end of a hydraulic cylinder 40 whose opposite end is pivotally supported at 41 to a lug depending from one of the side rails 9 of the bed frame. Fluid connections are also extended between this cylinder and the motor-operated pump within the housing 33. By some such means the two links 36

and 37 are power operated to rise from the position of FIG. 3 to that of FIG. 1, whereby to raise the frame thigh and leg sections 13 and 14, and also the mattress M thereon, the latter then being humped upwardly to provide a support below the knees of an occupant of the bed.

A control whereby the body section 12, or the thigh and leg sections 13 and 14, or both, may be operated separately or together, either up or down, may be conveniently provided by a switch 42 connected into the electrical circuits leading to the motor and a current source. It is to be noted that the mattress M at its head end may then be raised or lowered, with similar movements optionally imparted to the mattress at the juncture of the thigh and leg sections. An invalid bed of this general description, while advantageous in many respects, is greatly improved by the addition thereto of the hammock H of this invention, as will now be made apparent.

The hammock itself is sheet-like in that it is very thin, flexible and smooth. It should also possess ample tensile strength so that, when spread over the mattress and therebeyond at its opposite ends, it will be safe and comfortable to lie upon. A number of different materials are available for production of the hammock, some of textile materials, woven or otherwise, others of synthetic materials, and still others of paper or the like. The latter would normally be disposable after a single use, while the others, after washing and sterilization, might be re-used a number of times. Each hammock, regardless of the material used, is provided with an opening *o* at a point about opposite the rump of a person occupying the invalid bed, whereby to facilitate his elimination of body wastes there-through when desired. This opening may be peripherally reinforced, if needed, in accordance with common practice; likewise the side and ends of the hammock may be similarly treated, wherever required.

This hammock is provided at opposite ends with means whereby to facilitate its securement to anchorages provided therefor at the head and foot units 5 and 7 of the bed frame. Two specifically different kinds of such means are illustrated, one at each end of the hammock. Any other suitable attaching means might also be chosen as well. As shown in FIG. 2, the hammock end proximate to the head unit 5 of the bed is provided with a pair of straps or webbings 43 one extended adjacent to and parallel with each side of the hammock to extend beyond its end for a considerable distance. Each such strap is equipped with a removable buckle 44 or other means whereby its free end, when looped, may be adjustably secured. The opposite hammock end is shown as turned upon itself at 45, with a flap 46 thus formed stitched or otherwise secured to the hammock along a line which is spaced from its turning point to form therewith an elongated pocket 47 open only at its opposite ends. If needed, battens may be applied to opposite end portions of the hammock to stiffen it transversely.

To secure such a hammock fixedly in place, I provide a pair of clamps 48, each fitted to one end of the bed frame—to a leg 6 for example. Similar clamps 49 may be fitted around the legs 8 at its opposite end. The vertical positions of all these clamps is at a level about even with the body, thigh and leg sections 12, 13 and 14. Between the two clamps 48 at the head unit is extended a rod 50 fixedly held against axial movement by any appropriate device. Another rod 51 is similarly extended between the clamps 49 at the foot end of the bed, being readily removable therefrom by an axial movement when all resistance thereto is withdrawn. The straps 43 at the head end of the hammock, when fitted around the rod 50 thereat, may be adjustably secured by the buckles 44 or other suitable means. At its opposite end the elongated pocket opening 47 is adapted to receive the rod 51 there-through after which the rod is secured to the clamps 49 provided for its fixed anchorage. It is to be understood that the particular kind of means employed for securing

opposite ends of the hammock is largely a matter of choice, and that the two forms of such means herein illustrated are merely typical of many which might be availed of.

With its opposite ends fixedly anchored in place, the hammock body therebetween will extend over the mattress from end to end and therebeyond to be secured to the anchoring rods 50 and 51 affixed to opposite ends of the bed frame at a level about even with the under face of the mattress. The two end portions of the hammock, or straps extended therefrom, are then disposed between the mattress and bed ends. The remaining intermediate portion of the hammock then remains spread evenly over the mattress to underlie a person occupying the bed. For reasons which will presently appear, the overall length of the hammock is slightly greater than is the distance between the anchoring rods 50 and 51; any slack portions of the hammock tend to shift towards opposite ends of the bed and into the spaces beyond the proximate ends of the mattress.

A bracket 53 which is affixed to the body section 12 is provided with an upstanding arm 54 terminating slightly above the mattress top. This arm supports one end of a rod (or trunnion) 55 extending axially through (or from) a roller 56 with the addition of anti-friction bearings, if desired. A duplicate bracket at the opposite side of the body section is also affixed thereto to provide support for the rod (or trunnion) and roller thereat. It should be understood that the several operating parts for the body, thigh, and leg sections may also be provided in duplicate, one set adjacent each side of the bed. The roller periphery is desirably made relatively soft, as by the application thereto of a sleeve of resilient material. The position of the roller is slightly above the top of the mattress and also beyond its head end where it remains spaced from the head of the bed's occupant by a safe distance. The roller is also positioned so as to underlie the proximate end portion of the hammock and furnish a lineal arcuate turning point therefor adjacent its anchoring rod 50. In effect, the roller provides a crest point for support of the hammock thereat. It is also to be noted that friction between the hammock and roller, during upward swinging movement of the mattress body unit, is considerably reduced because of the slack at the hammock end which offers only a minimum of resistance during only a portion of each such operation.

When the bed occupant desires to defecate or urinate, the mechanism for operating the body section 12 is set in motion. The body section then swings upwardly from the position of FIG. 3 to that of FIG. 1, and in so doing raises the flexible mattress with it. But the roller axis is then moved through an arcuate orbit of its own about the pivot 17 as a center, and in this movement it also raises the proximate end of the hammock to provide a crest point thereat. The hammock slack occupying the space beyond the proximate mattress end is then taken up. As a result, the hammock is drawn relatively taut, tending to elevate its intermediate portion clear of the mattress throughout much of its length. At the conclusion of this movement, the hammock will be suspended over the mattress, except at its foot end, with the bed's occupant supported in an inclined position thereon. With his rump then located over the hammock opening *o*, the patient will be free to discharge body wastes therethrough for deposit in a bed pan 57 previously placed on the mattress therebelow. In the operation just described, only the body section 12 has been swung upwardly to raise the hammock, and in some cases this will suffice. Usually, however, the thigh and leg sections 13 and 14 will also be similarly operated so that the mattress will be raised elsewhere to provide a second crest point spaced considerably from the main crest point at the head end of the mattress. In this raised position, the hammock is flexed upwardly at two spaced points across which it is extended in a relatively taut condition of suspension. The weight of

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the occupant is concentrated largely between these crest points so as to deflect the hammock downwardly somewhat with its opening *o* disposed at a nadir point adjacent the occupant's rump. Sufficient space remains below the hammock for a bed pan to be placed on the mattress therebelow, whereby all conditions favorable for elimination of body wastes are provided.

An invalid bed equipped with the hammock of this invention enables its occupant to shift himself into and out of functioning positions without the aid of anybody, and to do this with expenditure of no appreciable effort. Nurses and orderlies who might otherwise be called upon to assist will then be freed for other duties. Furthermore, if the patient be a heavy person the job of moving him from one position to another is often beyond the strength of the average hospital attendant. Also, in cases where the patient is not to be moved at all, if possible, the present hammock suspension means can be relied upon to shift the patient to and from functioning position with little or no cooperation on anybody's part, thus doing safely what could not be accomplished manually by himself or by others. Pressing of the right switch button is all that is necessary. The patient can usually do that much and, if not, an attendant can readily attend to it. Also the hammock, when suspended, is capable of serving as a treating table with its opening *o*, or other openings to be formed therein, affording ready access to dorsal wounds or sores, free of pressure thereon while treatment is administered to the patient so suspended.

The hammock itself, if disposable, involves no problems of washing and sterilization—it may be sterilized when first made, then sealed in a package which is not opened until the time of use. If it is to be re-used, then it will have to be washed and sterilized in the usual way. In either case, it must be removed from the bed and a new one substituted from time to time. The anchoring means suggested herein is simple and easy to operate in any such changes so should not be a deterrent to its use. The simplicity of the hammock and the necessary hardware therefor facilitates its application to existing beds with few or only simple tools required. And if the bed be built with the necessary hardware installed from the beginning, repeated application of fresh hammocks thereto will involve only a minimum of work—much less than moving the patient's body by hand. The economic advantages of this hammock in replacing heavy distasteful work by nurses or orderlies with button-pushing by the patient himself should be a boon to all concerned.

I claim:

1. For use with an invalid bed having a frame comprising interconnected head and foot units between which is a jointed frame supporting a flexible mattress coextensive therewith, both spaced at opposite ends slightly from the bed end proximate thereto, the supporting frame, together with the mattress thereon providing an elongated body section adapted for upward swinging movement from a horizontal position to an inclined position wherein its head end is raised to a relatively high position:—for use with such an invalid bed, (1) elongated crest means fixedly extended crosswise of the bed at a point beyond the head end of the mattress and proximate to the bed head unit when the body section is in a horizontal position, (2) means carried by the body section of the mattress-supporting frame for supporting the elongated crest means in its fixed position beyond the head end of the mattress, (3) a flexible sheet-like hammock adapted to overlie (a) the elongated crest means in slidable engagement therewith and also (b) the mattress and to extend beyond opposite ends of the latter, and (4) anchoring means affixed to opposite ends of the bed frame below the mattress top, each adapted for connection with the proximate end of the hammock whereby to fixedly secure it in place thereat, the arrangement being such that, with upwardly swinging movement of the body section of the mattress-supporting frame the elongated crest

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means is also raised to a top position where the elongated crest means is stationed at its head end, the hammock being also carried upwardly with the body section of the mattress to span, in a relatively taut condition, the distance between elongated crest means and the anchoring means adjacent the opposite ends of the mattress, whereby an occupant of the hammock will be lifted therewith to an inclined position where the lower end of his body is disposed above the mattress a distance sufficient for accommodation of a bed pan therebelow whereby the occupant of the bed may freely discharge body wastes therethrough into the pan.

2. For use with an invalid bed having a frame comprising interconnected head and foot units between which is a jointed frame supporting a flexible mattress coextensive therewith, the jointed frame and mattress being spaced at opposite ends a short distance from the bed head and foot units, the joints of the supporting frame, together with the mattress thereon, defining a body section flexibly joined to the mattress-supporting frame at a point adjacent a thigh section, and a leg section flexibly joined to the thigh section, all adapted for upward swinging movements from a horizontal in-line position to inclined positions in which both the head end of the body section and the joined ends of the thigh and leg sections may be raised to relatively high positions:—for use with such an invalid bed, (1) elongated crest means fixedly extended crosswise of the bed at a point beyond the head end of the bed frame below the mattress top, each adapted head unit, (2) means carried by the body section of the mattress-supporting frame for supporting the elongated crest means in its fixed position at an elevation slightly above the top of the mattress, (3) a flexible sheet-like hammock adapted to overlie (a) the elongated crest means and in a slidable engagement therewith, and also (b) the mattress and to extend beyond opposite ends of the latter, and (4) anchoring means affixed to opposite end of the bed frame below the mattress top, each adapted for connection to the proximate end of the hammock whereby to fixedly secure it in place thereat, the arrangement being such that, with upward swinging movement of the body, thigh and leg sections of the mattress-supporting frame to elevated positions, the mattress supported thereby will also be raised therewith to provide two widely spaced linear crest points between which the hammock is suspended in a relatively taut condition whereby to lift an occupant of the bed to an inclined position where the lower end of his body is disposed above the mattress a distance sufficient for accommodation of a bed pan therebelow, when rested upon the mattress, the hammock being provided also with an opening opposite the bed pan whereby the bed occupant may freely discharge body wastes therethrough into the pan.

3. For use with an invalid bed as specified in claim 1, wherein the space between the head end of the mattress and the proximate end unit of the bed frame is wide enough to freely accommodate the slack portion of the hammock when the latter, then resting on the mattress, is in horizontal position with its head end portion extending therebeyond, and wherein the hammock, as specified in claim 1, when anchored to opposite ends of the bed frame and during a substantial portion of its upward swinging movement, moves through two stages, the first while the hammock slack portion is being withdrawn from the end space beyond the head end of the mattress, and in the second stage, while the mattress continues its upward swinging movement encounters frictional resistance as the elevated crest means slides along the under face of the hammock to its final position wherein the hammock is sustained at one end by the elongated crest means and at its opposite end by the mattress top.

4. For use with the invalid bed specified in claim 2 wherein the spaces between opposite ends of the mattress and the bed end units proximate thereto are each wide enough to freely accommodate proximate slack end

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portions of the hammock when the latter, then resting on the mattress, is in horizontal position, and wherein the hammock as specified in claim 2, when anchored to opposite ends of the bed frame and during a substantial portion of its upward swinging movement, moves through two stages, the first while the hammock slack portions are being withdrawn from the end spaces beyond the mattress ends, and the second stage while the mattress continues its upward swinging movement encounters frictional resistance as the elongated crest means slides along the under face of the hammock to its final position wherein the hammock is sustained solely by the two spaced linear crests of the mattress.

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