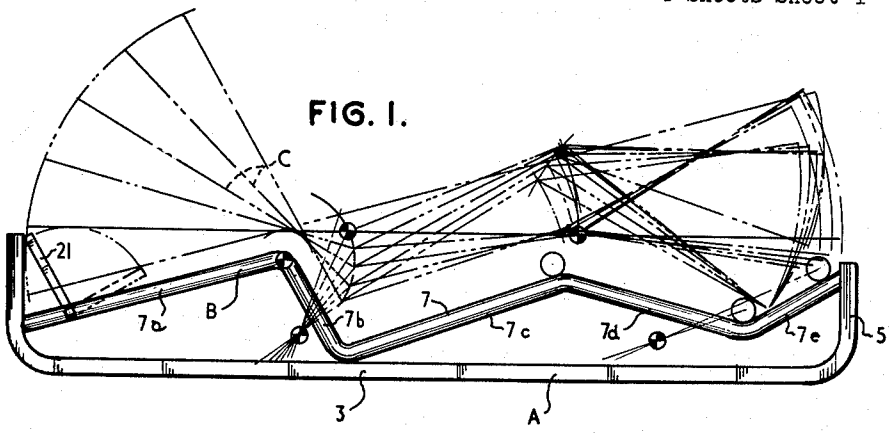
March 30, 1965 H. O. BERGENWALL 3,175,229

HOSPITAL BED

Filed Sept. 27, 1962 3 Sheets-Sheet 1

FIG. 1.



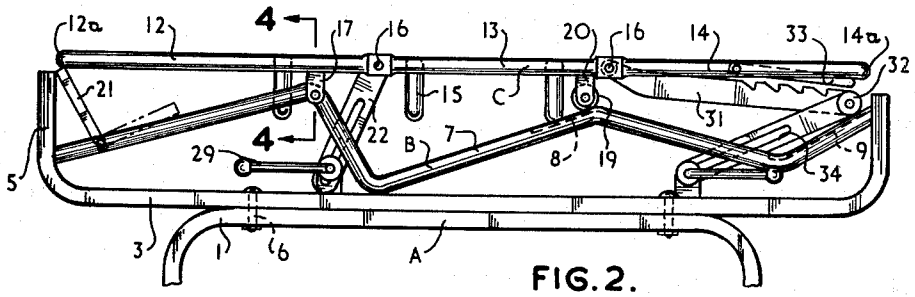


FIG. 2.

FIG. 4.

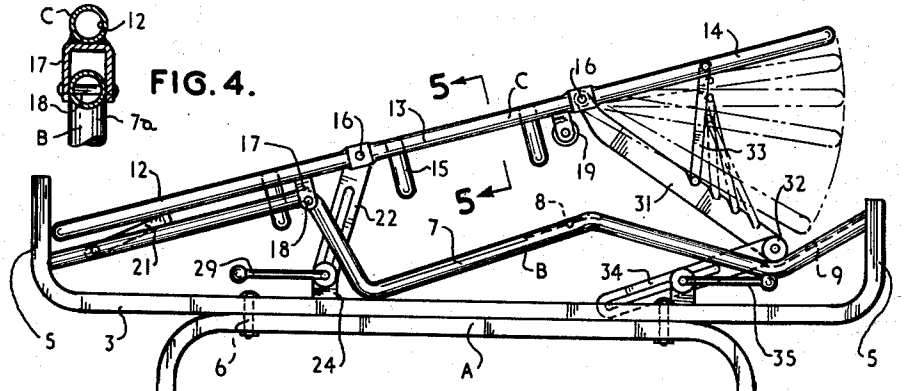


FIG. 3.



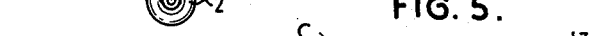


FIG. 5.

INVENTOR
HENNING O. BERGENWALL
W. Irvin Hackett
ATTORNEY

March 30, 1965 H. O. BERGENWALL 3,175,229

HOSPITAL BED

Filed Sept. 27, 1962 3 Sheets-Sheet 2

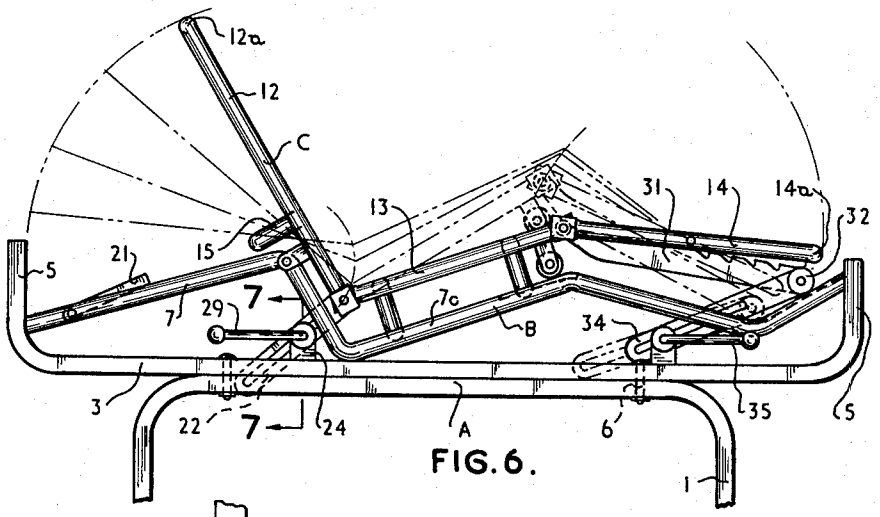


FIG. 6.

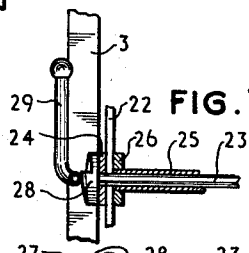
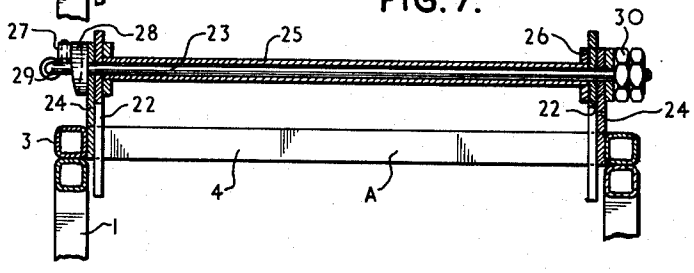


FIG. 7A.

FIG. 7.



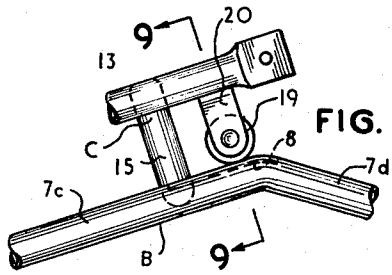
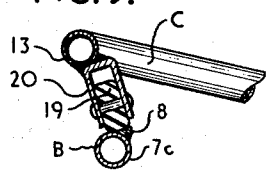


FIG. 8.

FIG. 9.



INVENTOR
HENNING O. BERGENWALL

ATTORNEY

March 30, 1965 H. O. BERGENWALL 3,175,229

HOSPITAL BED

Filed Sept. 27, 1962 3 Sheets-Sheet 3

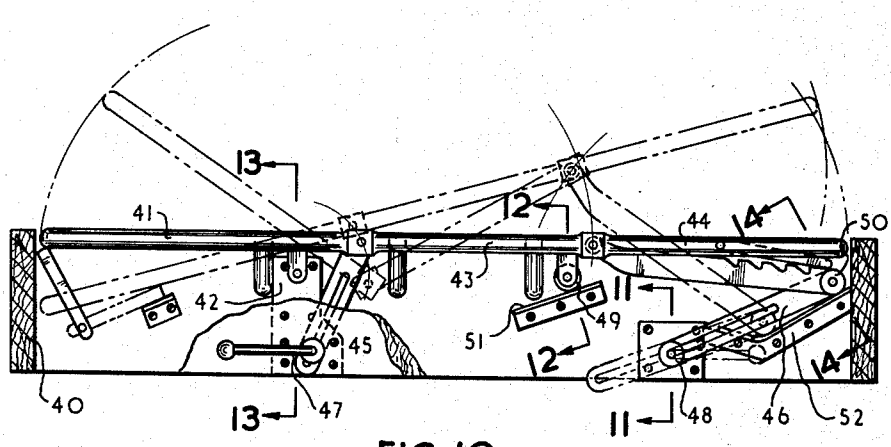
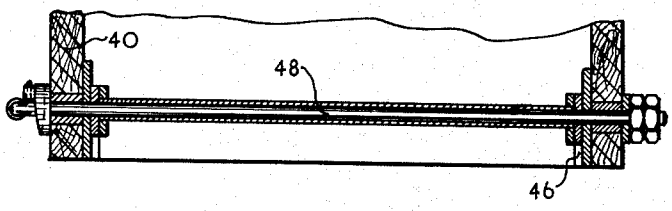


FIG. 10.

FIG. 11.



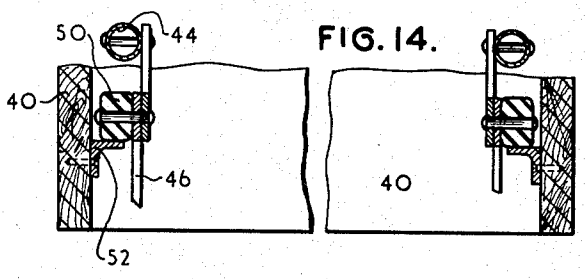


FIG. 14.

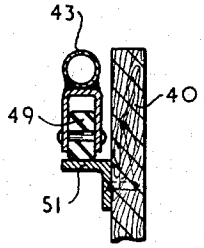
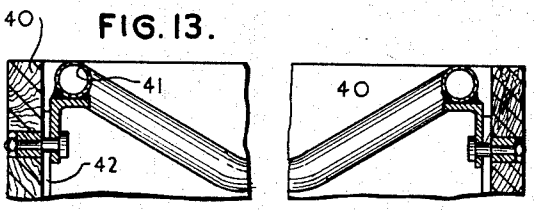


FIG. 12.

FIG. 13.



INVENTOR
HENNING O. BERGENWALL

ATTORNEY

United States Patent Office 3,175,229 Patented Mar. 30, 1965

3,175,229

HOSPITAL BED

Henning O. Bergenwall, Toronto, Ontario, Canada, assignor to Merex Furniture Company Limited, Toronto, Ontario, Canada, a company of Canada

Filed Sept. 27, 1962, Ser. No. 226,619
7 Claims. (Cl. 5—66)

This invention relates to improvements in a hospital bed and appertains particularly to one having an articulated spring or bed bottom.

An object of the invention is to provide an articulated type hospital bed in which the spring or bed bottom sections are so arranged that the user can readily adjust it to a variety of positions by manipulation of his body.

A further object is to provide a hospital bed with an articulated spring or bed bottom that is mounted on a frame superstructure in novel teetering and sliding relation enabling the adjustment of the bed into innumerable positions by the application of the lightest pressure or merest touch because of the balance of the bed parts and the utilization of the patient's weight on both the teetering and sliding sections.

A further object of the invention is the provision of an articulated type hospital bed in which the spring or bed bottom is slidably supported in part on inclined tracks of a frame superstructure.

A still further object of the invention is the provision of an improved clamping mechanism for locking the articulated spring or bed bottom sections in any desired adjustment.

To the accomplishment of these and related objects as shall become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts as shall be hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the claims hereunto appended.

The invention will be best understood and can be more clearly described when reference is had to the drawings forming a part of this disclosure wherein like characters indicate like parts throughout the several views.

In the drawings:

FIGURE 1 is a schematic side elevation of the present invention, illustrating the range of adjustments of which the articulated spring or bed bottom is capable;

FIGURE 2 is a side elevation of the articulated bed bottom and supporting structure, the former being shown in a horizontal plane position;

FIGURE 3 is a similar side elevation with the articulated bed bottom shown in an inclined plane position;

FIGURE 4 is an enlarged sectional detail of the hinge connection, as taken on line 4—4 of FIGURE 2;

FIGURE 5 is a transverse section of the mid section of the articulated bed bottom as taken on line 5—5 of FIGURE 3;

FIGURE 6 is a side elevation of the articulated bed bottom section in sitting position with variations thereof shown in dotted line;

FIGURE 7 is an enlarged transverse sectional-elevation of the clamping device, as taken on line 7—7 of FIGURE 6;

FIGURE 7A is a sectional plan view of the clamp handle detail;

FIGURE 8 is an enlarged side elevation detail of the lower end of the mid section of the bed bottom with its roller riding on the frame superstructure's inclined track;

FIGURE 9 is a transverse section thereof as taken on line 9—9 of FIGURE 8;

FIGURE 10 is a sectional side elevation of a modified form of the invention, as applied to a box frame;

FIGURES 11, 12, 13 and 14 are enlarged transverse sectional details thereof as taken on section lines 11—11, 12—12, 13—13 and 14—14 respectively, each as seen looking in the direction indicated by the arrows.

In carrying out this invention, the preferred construction as shown in FIGURES 1 to 9 inclusive comprises a metal bed frame A made with a pair of transversely spaced downwardly facing U-members 1 mounted on suitable casters 2 in the free ends of the arms thereof and each surmounted by an upwardly facing shallower U-member 3 braced by transverse frame bars 4 spaced throughout the length thereof; the opposite upturned ends or arms 5 of the U-member 3 marking the head and foot of the bed frame respectively. These frame parts 1 and 3 and crossbars 4 are of hollow tubular material, substantially square in cross section and the oppositely facing upper and lower U-members 3 and 1 on each side are suitably connected as by welding or fastening bolts 6, as shown.

On this neat, rugged, lightweight wheeled frame, a superstructure B is mounted that in turn supports an articulated spring frame, mattress support or bed bottom C. Actually this so-called superstructure is a part of the frame in the sense that it is permanently and rigidly secured thereto as by welding. The superstructure is in the form of a waved rail 7 of hollow tubular cross section running along each side of the frame and formed in five angularly disposed portions *7a*, *7b*, *7c*, *7d* and *7e* that rise or fall in different inclines but all lie in a common vertical plane. The free end of portion *7a* is welded to the head end arm of the frame U-member 3 about ⅓ of the way up from the bottom, whence it rises to a high point then descends acutely in the portion *7b* to engage and be welded again to the U-member 3 at its junction with portion *7c* that rises at approximately the incline of portion *7a* but to a lesser height where it joins declining portion *7d* that near the foot end of the frame U-member, and at a level above the base of the U, turns upwards in a short incline portion *7e* that meets and is welded to the foot end arm of the frame U-member 3 near the top thereof. The upwardly inclined portion *7c* of each rail, near its crest where it joins the portion *7d*, has an inwardly extending fin or flange 8 that serves as a downhill track to be later explained. Similarly, the end portion *7e* of each rail has an inwardly extending fin or flange 9 running its entire length to be likewise used as a downhill track. On and between or within these laterally spaced waved rails 7 the articulated spring or bed bottom C is supported in a very specially balanced teetering and sliding relation due to the form and proportion of the articulated bed bottom and its pivotal attachment to and sliding relation on the waved frame superstructure rails.

The articulated spring frame, mattress support or bed bottom C, called a bed bottom for short, consists of three longitudinally arranged sections that may for convenient reference be termed a back section 12, mid section 13 and foot section 14 respectively. These sections are constructed of hollow metallic tubing that in the case of the end sections, namely the so-called back section 12 and foot section 14, extend transversely to form the head and foot ends 12*a* and 14*a* respectively of the bed bottom and are suitably reinforced as by the transverse drop braces 15. At their suitably overlapped abutting ends, the sections are pivotally connected by horizontal pivot pins 16 for free vertical hinging. Though of different lengths, each section is of substantial length being proportioned approximately, in round figures, as 40–25–35 for the back, mid and foot sections in that order.

Of the three bed bottom sections, only the back section 12 is pivotally connected to the frame. An inverted channel-shaped bracket 17 is welded on the bottom of the

section at each side to straddle the frame superstructure waved rail 7 at its high point where the upper end portion 7*a* meets the portion 7*b* and be connected thereto by a pivot pin 18, as seen in FIGURE 4. Here the proportion of the bed bottom length is significant in the balance and teetering of this articulated member. The pivot bracket 17 with the center of pivot pin 18 should be on the back section 12 at a point at least 25% of the way in from the pivotal connection 16 with the mid section 13, i.e., if the back section 12 be thirty-two inches long, the bracket pivot should be at least eight inches up toward the head from the inner end of the section. This pivot location may range from 25 to 30% of the length of the section in a headwards direction under normal circumstance, but it should be not less than 22½%.

The mid section 13 near its lower end where it connects with the foot section 14, has a nylon roller 19 on each side normally riding on the downhill rail tracks 8; the rollers being carried in mounts 20 of sufficient depth to support the lower end of the mid section level with the back section when the latter is in horizontal position, as seen in FIGURE 2. (See also FIGURES 8 and 9.) To support the head end of the back section 12 in horizontal position, a bail 21 mounted on and extending between the rails 7 can be swung upwardly to engage the under side of the bed bottom section as a prop.

On each side of the bed bottom, from the pivot connection between the back and mid sections 12 and 13, an elongated slotted brace 22 swings pendantly. Through the slots in the spaced braces 22 a clamping rod 23 extends that is supported in bearing plates 24 fastened to and rising above opposite side frame members 3. A sleeve 25 with flanged ends 26 embraces the rod between the slotted braces 22. At one end the rod has a projecting boss 27 to engage an inclined wedge cam 28 welded on the bearing plate 24, exterior of which boss, the rod is disposed at right angles in a knobbed hand lever 29 while at the opposite end the rod is threaded and carries a pair of adjustable nuts 30 to tighten or loosen the range of the clamping action.

From the pivot connections 16 between the mid and foot sections, a pendant arm 31 swings on each side. Each has a nylon roller 32 on its free end that rides on the downhill track 9. The upper side of the arms 31 are notched to adjustably receive a swingable bail-like prop 33 that is suspended between the sides of the foot section. An elongated slotted brace 34 is pivotally attached in toggle-like relation at the roller end of each arm 31, being engageable by a lever operated locking clamp 35 also mounted on the frame member 3 and similar in all respects to the clamp rod 23 with lever 29 already described.

As can be seen from the several figures of the drawings, this articulated hospital bed bottom is extremely versatile and capable of being adjusted into an amazingly wide range of positions by virtue of its connection to the frame by the pivot attachment of the back section only and the easily operated locking of the other sections in desired elevation by the clamp levers 29 and 35 together with the adjustment of the prop 33. This is facilitated by the utilization of the waved side rails 7 with their special contour such as the sloping portion 7*a* that allow the downward slope of the head end of the back section 12, as seen in FIGURE 3; and the steep decline of portion 7*b* to the lowest point of the entire rail to accommodate the seat segment of the bed bottom when arranged in sitting position, as seen in FIGURE 6, to facilitate a patient getting into or out of bed at a lower level. There is no need for a patient to vacate the bed whilst it is being adjusted to any position; neither is its adjustment burdensome on an attendant and it can be locked in position with one finger.

Especially, however, the construction arrangement and proportioning of the essential cooperating parts has been primarily designed to enable a patient when the locking

clamps are released to hinge the sections of the articulated bed bottom into desired positions by use of his body weight and movement. It is for this reason that the sole pivot point connecting the bed bottom to the frame is at least approximately 25% of the way along the back section from its hinge connection with the mid section to provide that a proportionate part of the patient's weight operates inside the pivot to almost teeter the back section and by arranging that the mid and foot sections are supported by rollers on downhill tracks, so that the patient by using his limbs can augment the nearly balancing weight on the back section pivot to cause the bed bottom to hinge as desired, without resort to electric motors, springs or other extraneous sources of power.

In the modified structure shown in FIGURES 10–14, the principle of the invention remains unchanged in the utilization of the near balancing of the back section and the provision of the supplementary force required to teeter it utilizing the mid and leg sections of the bed bottom supported on rollers riding on downhill tracks. Here, in place of the frame of tubular U-shaped members, I employ a box frame 40 in which the articulated three-section bed bottom is supported, the back section 41 being pivoted in frame plates 42 in the balanced arrangement clearly described and the mid and foot sections 43 and 44 being provided with the braces 45 and 46 and locking clamps 47 and 48 respectively, similar to those already described and the mid and foot sections 43 and 44 being similarly supported on nylon rollers 49 and 50 riding the downhill tracks 51 and 52 as in the previous case except that now these tracks are in the form of angles mounted on and projecting in from the box frame 40.

From the foregoing description taken in connection with the accompanying drawings, it will be manifest that a hospital bed is provided that will fulfil all the necessary requirements of such a device, but as many changes could be made in the above description and many apparently widely different embodiments of the invention may be constructed within the scope of the appended claims, without departing from the spirit or scope thereof, it is intended that all matters contained in the said accompanying specification and drawings shall be interpreted as illustrative and not in a limitative or restrictive sense.

What is claimed as new is:

1. A hospital bed comprising a frame, a waved rail secured along and superposed upon each side thereof, an articulated bed bottom mounted on said rails consisting of back, mid and foot sections pivotally connected for vertically hinging movement at their abutting ends, the back section alone of said bed bottom being pivotally attached to said waved rails and the mid and foot sections of said bed bottom being slidable along and movable away from said waved rails, and clamping means adjustably connecting at least one of the pivotal connections of said articulated bed bottom with the frame for locking said bed bottom sections in any desired adjusted position.

2. The structure according to claim 1 in which said clamping means includes a manually operable clamp secured on said frame and a bracket hanging from the pivot connection between the back and mid sections of said bed bottom on each side thereof and adjustably engaged by said frame carried clamp.

3. The structure according to claim 1 in which said clamping means includes a manually operable clamp secured on said frame, an arm hanging from the pivot connection between said mid and foot sections of said bed bottom on each side thereof and an elongated slotted brace pivotally attached in toggle-like relation at the lower end of each arm and adjustably engaged by said frame carried clamp.

4. The structure according to claim 3 wherein the hanging arms are notched and a bail-like prop suspended from the foot section is selectably engageable therewith.

5. The structure according to claim 1 wherein a pair

of laterally spaced rollers are mounted under the mid and foot sections of said bed bottom and wherein said waved rails have inwardly extending inclined tracks on which said mid and foot section rollers normally rest when the bed bottom sections are arranged in a horizontal plane and along which said pairs of rollers ride downhill when said bed bottom sections are hinged into sitting position.

6. The structure according to claim 1 in which the clamping means includes a bearing plate on each side of the frame, a transverse rod rotatable in said bearings having an adjustment nut threaded on one end and a lever arm extending radially therefrom at the opposite end with a projecting boss thereon, a cam on the confronting bearing plate engageable by said boss, an elongated sleeve on said rod with a flange at each end and a slotted bracket pendent from the bed bottom slidable on said rod and disposed intermediate the sleeve flange and the bearing plate on each side.

7. A hospital bed comprising a frame with spaced inclined parallel tracks along opposite sides thereof and an articulated bed bottom consisting of back, mid and foot sections pivotally connected for hinging movement at their abutting ends; said bed bottom back section being pivotally attached to said frame and said mid and foot sections being slidably engageable with the inclined tracks

thereof; said frame consisting of a connected downturned and an upturned U-member on each side spaced by crossbars with a waved rail nested in the upturned U-member on each side and rigidly secured to said member at opposite ends and an intermediate point, said waved rail having five angularly disposed portions with inclined tracks provided on two of them.

References Cited by the Examiner

UNITED STATES PATENTS

2,567	4/42	Wolley	2—66
263,345	8/82	McDonald	5—66
879,442	2/08	Clemetson	5—66
1,289,959	12/18	Taylor	5—66
1,402,106	1/22	Stark	5—66
1,899,762	2/33	Logan et al.	2—66
2,108,913	2/38	Bawer	5—66
2,281,209	4/42	Smith	5—66
2,357,242	8/44	Wahl	5—66
2,658,209	11/53	Travis	5—66

FOREIGN PATENTS

461,368	11/49	Canada.
9,807	of 1902	Great Britain.

FRANK B. SHERRY, *Primary Examiner.*