Dec. 26, 1933. B. McINTOSH 1,941,263

ARTICULATED BEDSPRING

Filed May 24, 1932 2 Sheets-Sheet 1

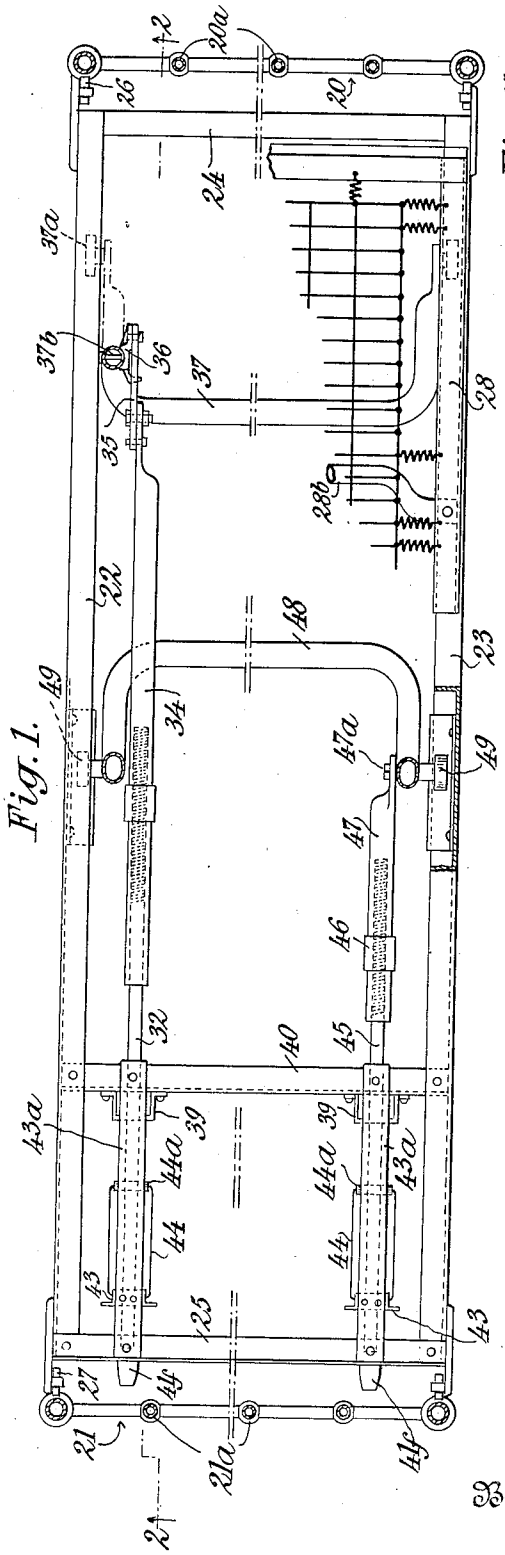


Fig. 1.

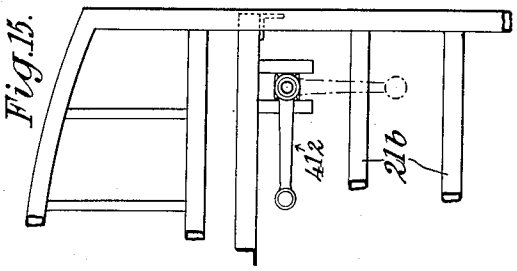


Fig. 15.

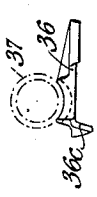


Fig. 4.

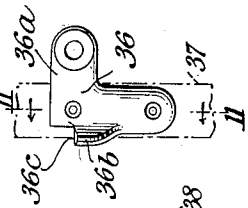


Fig. 6.

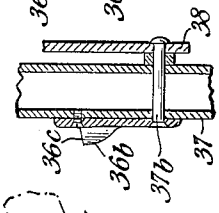


Fig. 5.

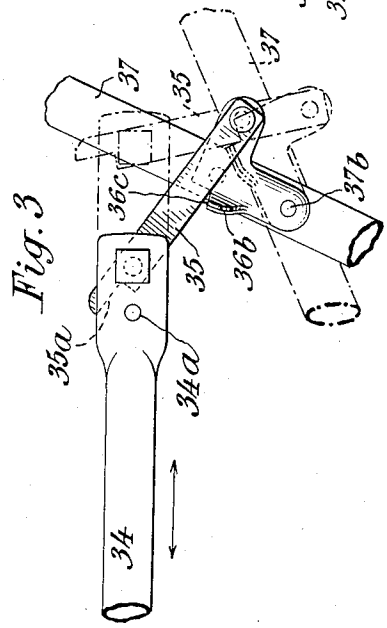


Fig. 3

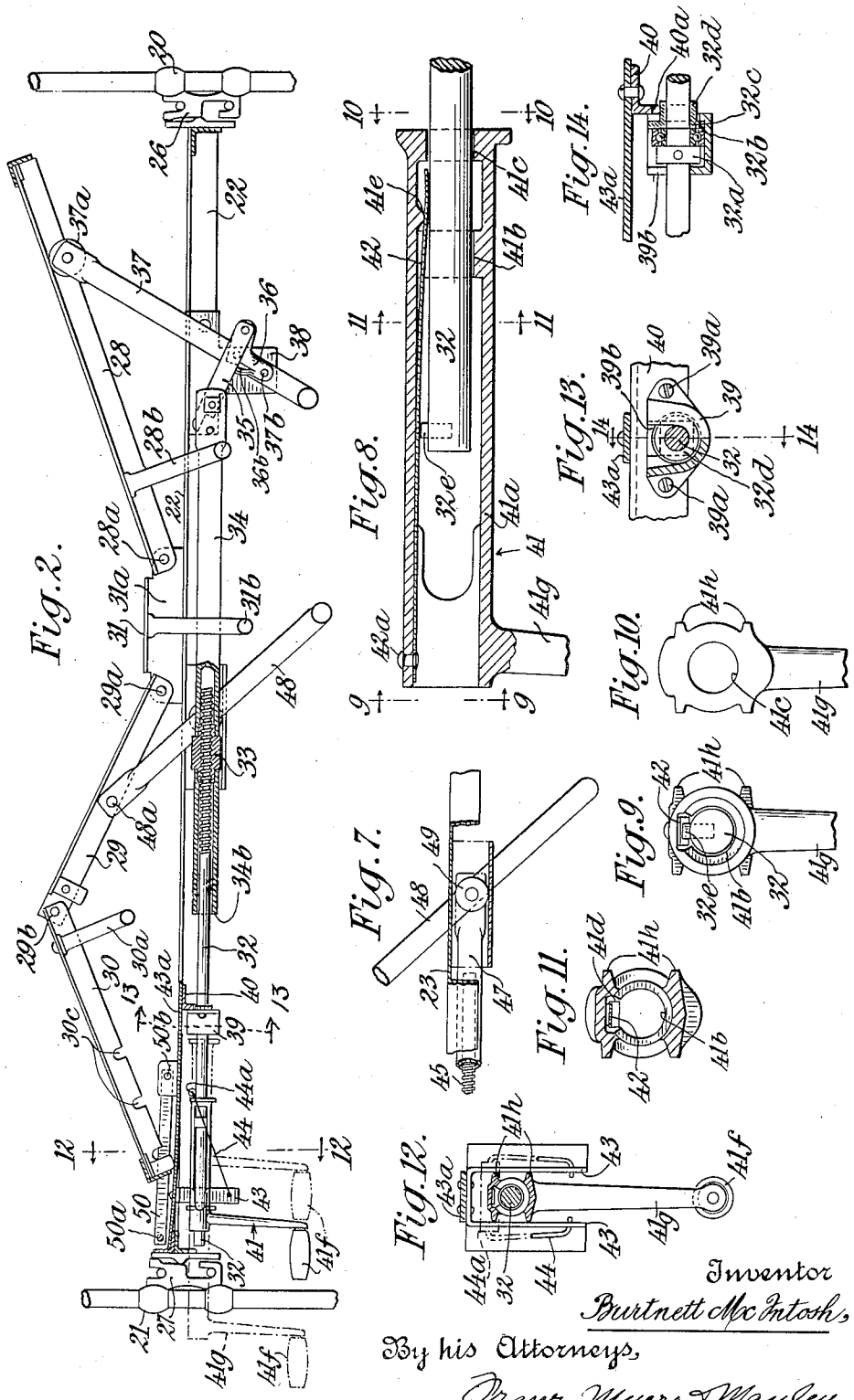
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ARTICULATED BEDSPRING

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UNITED STATES PATENT OFFICE

1,941,263

ARTICULATED BEDSPRING

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7 Claims. (Cl. 5—69)

The present invention relates to bed springs comprising a plurality of articulated or hingedly connected sections and to the means for controlling the adjustment of said sections, and aims to provide certain improvements therein.

Articulated bed springs as at present constructed usually consist of three sections, namely, a body-supporting section, a thigh-supporting section and a leg-supporting section. These sections are hingedly connected to either the bed frame or to each other and are adapted for independent movement with respect to the normal plane of the spring or for conjoint movement, dependent upon the manner of their cooperative relation and the manipulative means therefor. Usually the body-supporting section is independently movable through one operative agency, and the thigh-supporting section and leg-supporting section conjointly operable through a second operative agency. The leg-supporting section, however, may also be adjusted through an independent agency, if desired. Although bed springs of this type have been found to be generally satisfactory, they nevertheless possess various objectionable characteristics. For example, the manipulation of the sections when supporting a heavy person requires the exercise of great physical effort; they are slow in operation; they provide either unsightly or obstructive projections for the manipulation of the various sections; and are usually noisy in operation.

According to my present invention the foregoing objectionable features are remedied in a simple and practicable manner by the provision of novel operative connections between the operating shafts and the sections, by novel disappearing handles for operating the shafts and by the provision of means for substantially lessening or deadening the noise incident to the adjustment of the spring sections. These features of novelty, as well as others not specifically enumerated, will be apparent from the detailed description which follows, when considered in conjunction with the accompanying drawings wherein I have shown certain preferred embodiments of my invention, and wherein:

Figure 1 is a top plan view of a bed embodying my invention, parts thereof being broken away to show details of construction.

Fig. 2 is a longitudinal section taken substantially along the plane of the line 2—2 of Fig. 1.

Fig. 3 is a side elevation on a somewhat enlarged scale showing two positions of the operating means and elevating lever for the body-supporting section.

Figs. 4, 5 and 6 show a top plan view, a longitudinal section and a side elevation respectively, of a lug forming a detail of the invention.

Fig. 7 is a side elevation of the operating means and elevating lever for the thigh and leg-supporting section, parts thereof being broken away.

Fig. 8 is an enlarged longitudinal section of the operating handle and its manner of mounting upon the operating shaft.

Figs. 9 and 10 are opposite end views of the operating handle as seen when looking in the direction of the arrows 9—9 and 10—10, respectively, on Fig. 8.

Fig. 11 is a transverse section taken substantially along the plane of the line 11—11 of Fig. 8.

Figs. 12 and 13 are transverse sections taken substantially along the planes of the line 12—12 and 13—13, respectively, of Fig. 2.

Fig. 14 is a section taken substantially along the plane of the line 14—14 of Fig. 13.

Fig. 15 is a fractional end elevation of the foot of a bed having horizontal filler elements, with the operating handle of the present invention applied thereto.

Referring to the drawings, let the numerals 20 and 21 indicate respectively the head and foot of a hospital bed having a bed bottom comprising side rails 22 and 23 and end rails 24 and 25, said bed bottom being supported by the head and foot portions through the medium of suitable connecting joints 26 and 27. The bed frame may be of any desired or preferred construction, and as herein shown, the head and foot members are provided with vertically-extending filler pieces 20*a* and 21*a*, respectively.

Mounted upon the bed bottom is an articulated bed spring comprising a body-supporting section 28, a thigh-supporting section 29, a leg-supporting section 30, and a fixed section 31 between the sections 28 and 29. To the side members 31*a* of the section 31, the adjacent ends of the sections 28 and 29 are hingedly or pivotally mounted, as indicated at 28*a* and 29*a*, respectively. The leg-supporting section 30 is pivoted, as shown at 29*b*, to the opposite end of the thigh-supporting section 30, the free or unconnected end of said leg-supporting section being adapted to ride upon the side rails 22 and 23, as the pivoted end of the section 30 is elevated. For reinforcing the spring sections transversely thereof, the sections 28, 30 and 31 are provided with tubular braces 28*b*, 30*a* and 31*b*, respectively.

As is conventional with beds of the type to

which the present invention relates, the articulated sections 28, 29 and 30 are adapted for independent or conjoint elevation with respect to the bed frame, and various means have been proposed for accomplishing this by manipulation of one or more operating members from the foot of the bed.

According to the present invention, the means which I provide for manipulating the articulated section 28 comprises an operating shaft 32 supported by the bed bottom in substantially longitudinal parallel relation thereto, one end of said shaft terminating inwardly of, but in proximity to, the foot 21 of the bed, and the other end being screw-threaded and extending through a nut 33 which is non-rotatably carried by a tubular sleeve 34, to the inner end of which is pivotally connected one end of a link 35, the other end of which, in turn, is pivotally connected to a projection 36*a* upon a lug 36, which latter is fixedly mounted upon an elevating lever 37. The lever 37 is of U-shape and extends across the width of the bed frame, the upstanding arms of said lever carrying at their free ends, rollers 37*a*, which engage and are adapted to ride against the underface of the side rails of the body-supporting section 28. One arm of the lever 37 intermediate its ends is pivotally mounted, as indicated at 37*b*, to a depending bracket 38 mounted on the side rail 22. The lug 36 also has a lateral extension 36*b* which extends preferably at a right-angle to the extension 36*a* and provides a shoulder or fulcrum 36*c* for the link 35 when the latter is in a position extending downwardly with respect to the horizontal.

For supporting the shaft 32 I provide a cradle 39 which is secured, as indicated at 39*a*, to the depending arm of an angle iron member 40 which extends transversely of the bed bottom. The cradle 39 is of U-shaped cross-section and has its end walls cut away or slotted, as indicated at 39*b*, through which the shaft passes. Coincident with the cut away portion in an end wall of the cradle 39, a portion of the depending flange of the angle iron 40 is also cut away, as indicated at 40*a*, to provide necessary clearance for said shaft. Within the cradle 39 there is disposed a sleeve 32*a* which is fixedly mounted on the shaft, a ball-bearing 32*b* and a second sleeve 32*c* having a bushing extension provided with a square end 32*d* which projects through the slotted portions 39*b* and 40*a*, as best shown in Figs. 13 and 14. The elements 32*a* to 32*d* within the housing 39 support the shaft in a manner such that it is held against longitudinal movement, but is permitted a limited rocking movement in a vertical plane.

At the outer or foot end of the shaft 32 there is mounted an operating handle 41 having a bearing part 41*a* longitudinally slidable upon the shaft. The bearing part 41*a* of the handle has a cross-sectional contour which can be best determined from an inspection of Figs. 9, 10 and 11, it being apparent that the normal inner diameter of said bearing part is substantially greater than the diameter of the shaft 32. At the rear or inner end of said bearing part, however, the internal diameter is reduced, as indicated at 41*b* and 41*c*, whereby there is provided a bearing for the handle upon the shaft. Within the bearing part 41*a* of the handle is a longitudinally-extending groove 41*d*, which extends the major length of the handle and terminates in an abutment 41*e* directly beyond the bearing 41*b*, it being noted that the groove 41*d* also extends through the bearing 41*b*. Within said groove is disposed a flat leaf-spring 42 which is riveted at one end to the handle, as indicated at 42*a*, the other end of said spring being free and extending beyond the abutment 41*e*. The shaft 32 at its outer end is provided with a radially-extending projection 32*e*, which latter is of a height to normally press against the leaf-spring 42 and provides an additional bearing engagement between the shaft and the handle bearing part 41*a*. It will be noted, however, that the projection 32*e* does not normally lock the handle upon the shaft for unitary rotation, such locking engagement being only provided when the bearing portion 41*a* of the handle is withdrawn outwardly upon said shaft, or to the left, as viewed in Figs. 2 and 8, whereupon the projection 32*e* will ride into the groove portion of the bearing 41*b* and be stopped by the abutment 41*e*. When in such engagement the handle and shaft will be locked together for unitary rotation. The handle 41 when in said outermost position upon the shaft 32 will have its operating arm 41*g* and gripping portion 41*f* disposed beyond or outwardly of the foot of the bed and free for manipulative rotation. To guide the handle 41 in its movements inwardly and outwardly upon the shaft and to normally maintain it in proper relation with respect to the shaft when the handle is pushed inwardly of the foot of the bed, the bearing portion 41*a* of the handle is formed with lateral ribs 41*h* which engage between a pair of depending arms 43 suitably supported upon protecting strips 43*a* secured upon the bed bottom. These arms 43 are located at such position with respect to the foot of the bed that when the handle is pulled outwardly to the limit of its outward movement upon the shaft it will clear said brackets and thus be free to rotate with the shaft as a unit. Pivotally mounted on the brackets 43 and normally extending over the top of the shaft 32, is a bail-like member 44, the bight or transverse portion of which is provided with a piece of rubber tube 44*a* which functions to deaden impact and the noise of the handle when the latter is pushed inwardly upon the shaft. The bail-like member 44, however, is mounted so that it can be raised above the top surface of the handle bearing part 41*a* and permit the latter to be extended farther inwardly along the shaft 32 and beyond the brackets 43, in which position the handle will again be free for rotative movement with relation to the shaft, and advantage is taken of this to tie the handle against the bottom of the bed spring in the course of shipping the same.

For manipulating or operating the thigh and leg-supporting sections 29 and 30, I provide a second operating shaft 45, upon one end of which is slidably mounted an operating handle 41′ similar to 41, and the other end of which is screw-threaded and engages a nut 46 carried by a sleeve 47 in the manner quite analogous to that described for the parts 32, 33 and 34. One end of the sleeve 47 is pivotally connected, as indicated at 47*a*, to an upstanding arm of a U-shape lever 48, the free ends of which are pivotally connected to the side rails of section 29, as indicated at 48*a*. Mounted on the upstanding arms of the lever 48 upon axes coincident with the pivotal mounting 47*a* are the trunnions 49 adapted to ride upon the side rails 22 and 23 as the lever 48 is elevated and lowered through rotation of the shaft 45.

For the purpose of independently varying or

controlling the inclination of the leg-supporting section 30, the side rails of the latter are provided with slots or detents 30c adapted to receive a transverse pin 50a carried by arms 50, which, in turn, are pivotally mounted on lugs 50b supported on the side rails.

Normally the articulated sections 28, 29 and 30, and the fixed section 31 comprising the spring, are disposed in a common horizontal plane. Now let it be assumed that it is desired to elevate the body-supporting section 28 to an angle of 45° with respect to the bed bottom. The operating handle 41, which is normally disposed inwardly of the foot of the bed, is grasped and pulled outwardly to the limit of its movement to bring the handle and shaft into interlocking engagement. During this movement the projection 32e riding against the spring 42 within the handle bearing portion 41a will cushion the impact of the projection 32e with the abutment 41e, and will also deaden the sound thereof. The handle and shaft being locked, rotation of the former will rotate the latter, and in so doing will move the tubular sleeve 34 toward the foot of the bed. In the course of this movement the force acting upon the elevating lever 37 through the link 35 and fulcrum 36c on the lug 36 will render the raising of said section 28 a comparatively simple matter, even though a patient weighing upwards of 200 pounds is resting thereon. By continuing the rotation of the shaft the section 28 can be brought into perpendicular relation with the bed bottom. In the course of this movement after the link 35 has passed its horizontal position the force applied to the lever 37 will act directly through the link 35. When the section 28 reaches the limit of its upward movement the end 34b of the operating member 34 will engage the depending member of the angle iron 40 and prevent further rotation of the shaft. When the section 28 is raised to its desired point, the handle 41 is pushed inwardly upon the shaft, in which movement it is guided by the depending arms 43 and the impact of the engagement of the inner end of the handle is cushioned by the rubber tube 44a on the bail 44. Of course, to lower the section, the handle must be again withdrawn and rotated in the opposite direction. To insure against the tubular sleeve engaging end of the link dropping down below the horizontal, said link end is formed with a recessed portion 35a which is adapted to engage over a pin 34a on the sleeve 34.

Where it is desired to elevate the thigh-supporting section, and with it the leg-supporting section, the elevating lever 48 for said sections is manipulated through operation of the shaft 45 through the operating handle 41' carried thereby in a manner similar to that explained in connection with the elevation of section 28.

Where an operating handle such as 41 is to be used with a bed having horizontal or lateral filler elements 21b, such as shown in Fig. 15, the handle, instead of having a depending arm which is normally in the plane of the groove 41d, said arm may be disposed so as to extend at right-angles to said plane, as shown in full line position in Fig. 15. With such arrangement it will be apparent that after an adjustment of a spring section has been made, the arm of the handle is brought into horizontal position, and the handle may thereupon be pushed inwardly upon the shaft through the lateral filler pieces of the foot of the bed.

While I have shown and described certain preferred embodiments of my invention, I do not wish to be limited to the details of construction disclosed, since it will be apparent to anyone skilled in the art that changes may be made therein without departing from the spirit of the invention.

What I claim is:

1. In a bed bottom comprising a spring having a plurality of articulated sections, a pivotally mounted lever for elevating an articulated section and an operating member for moving the lever, the combination of a link connecting the operating member with the lever, and a lug on the lever adapted to provide a fulcrum for the link.

2. In a bed bottom comprising a spring having a plurality of articulated sections, a pivotally mounted lever for elevating an articulated section and an operating member for moving the lever, the combination of a link connecting the operating member with the lever, and a lug on the lever having projections thereon extending substantially at right angles to each other and beyond the surfaces of the lever, one projection adapted to provide a fulcrum for the link and the other providing a point of connection for the link with the lever.

3. In a bed bottom comprising a spring having a plurality of articulated sections, a lever pivotally connected to the bed for elevating an articulated section and an operating member moving longitudinally of the bed for moving the lever, the combination of a link pivotally connected to the operating member and to the lever, and a lug on the lever adapted to provide a fulcrum for the link.

4. In a bed bottom comprising a spring having a plurality of articulated sections, a lever pivotally connected to the bed bottom for elevating an articulated section and an operating member extending and movable longitudinally of the bed for moving the lever, the combination of a link pivotally connected to the operating member and to the lever, the link being connected to the lever at a point which remains below the connection of the link with the operating member until the lever is moved from its normal position in which it does not support a section of the bed bottom to a position approximately at a right angle to the bed bottom.

5. In a bed bottom comprising a spring having a plurality of articulated sections, a lever pivotally connected to the bed bottom for elevating an articulated section and an operating member extending and movable longitudinally of the bed bottom and substantially parallel thereto for moving the lever, the combination of a link pivotally connected to the operating member and to the lever, and a lug on the lever adapted to provide a fulcrum for the link.

6. In combination, a bed bottom comprising a spring having an articulated section, a lever pivotally connected to the bed bottom for elevating said articulated section, a substantially horizontally-extending and movable operating member for moving the lever, a normally downwardly extending link pivotally connected at one end to the operating member and at its other end to the lever, and a fulcrum element on the lever for the connecting link.

7. In combination, a bed bottom comprising a spring having an articulated section, a lever pivotally connected to the bed bottom for elevating said articulated section, a substantially horizontally-extending and movable operating mem-

ber for moving the lever, a rotatable shaft for moving the operating member longitudinally of the bed, a normally downwardly-extending link pivotally connected at one end to the operating member and at its other end to the lever and a fulcrum element on the lever for the connecting link, said link being adapted to move toward the horizontal as the lever is moved to elevate the articulated section, and said link being adapted to disengage the fulcrum as the link approximates its horizontal position.

BURTNETT McINTOSH.