Sept. 1, 1953 J. S. SHOWALTER 2,650,371

ADJUSTABLE SUPPORT

Filed Sept. 29, 1950 2 Sheets-Sheet 1

Fig. 1.

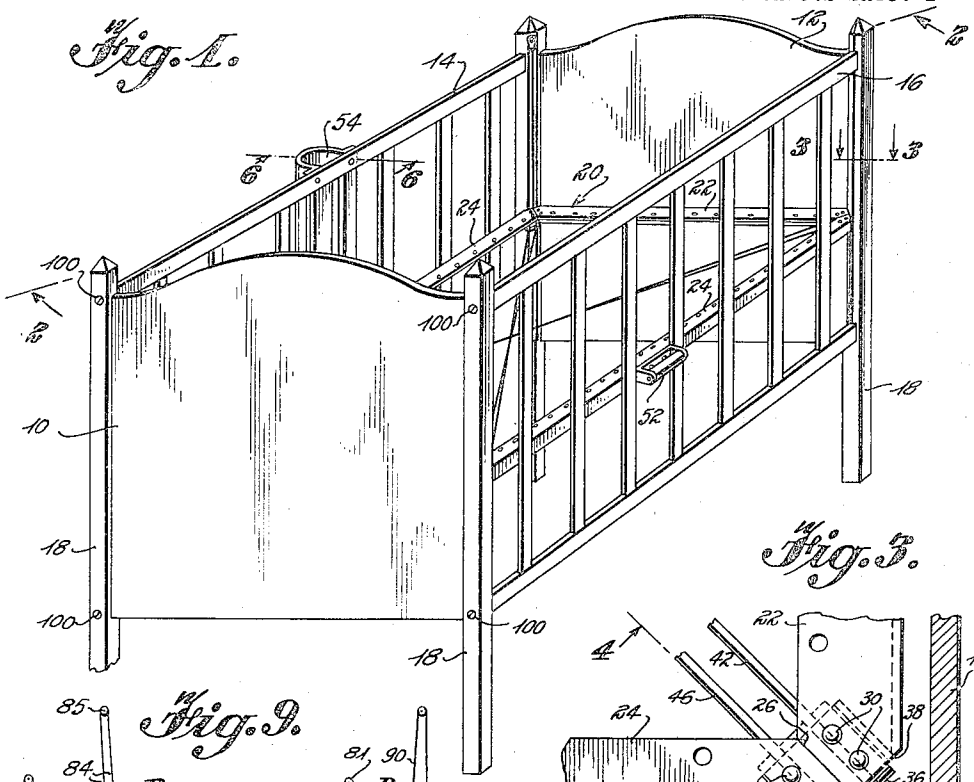


Fig. 3.

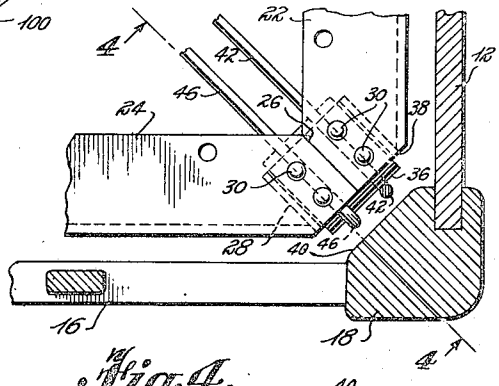


Fig. 2.

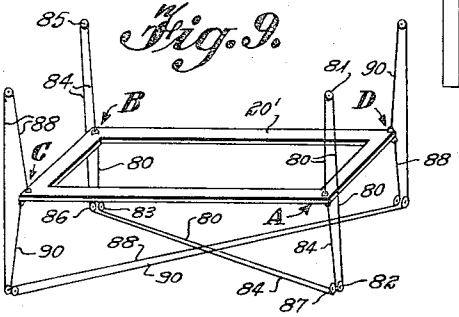


Fig. 4.

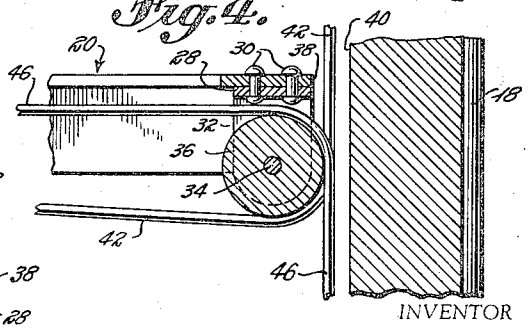
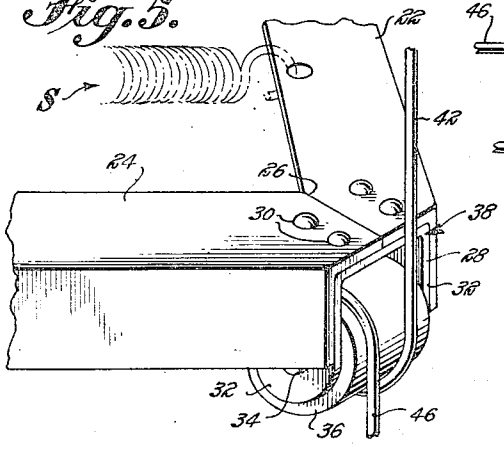


Fig. 5.



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Fig. 5.

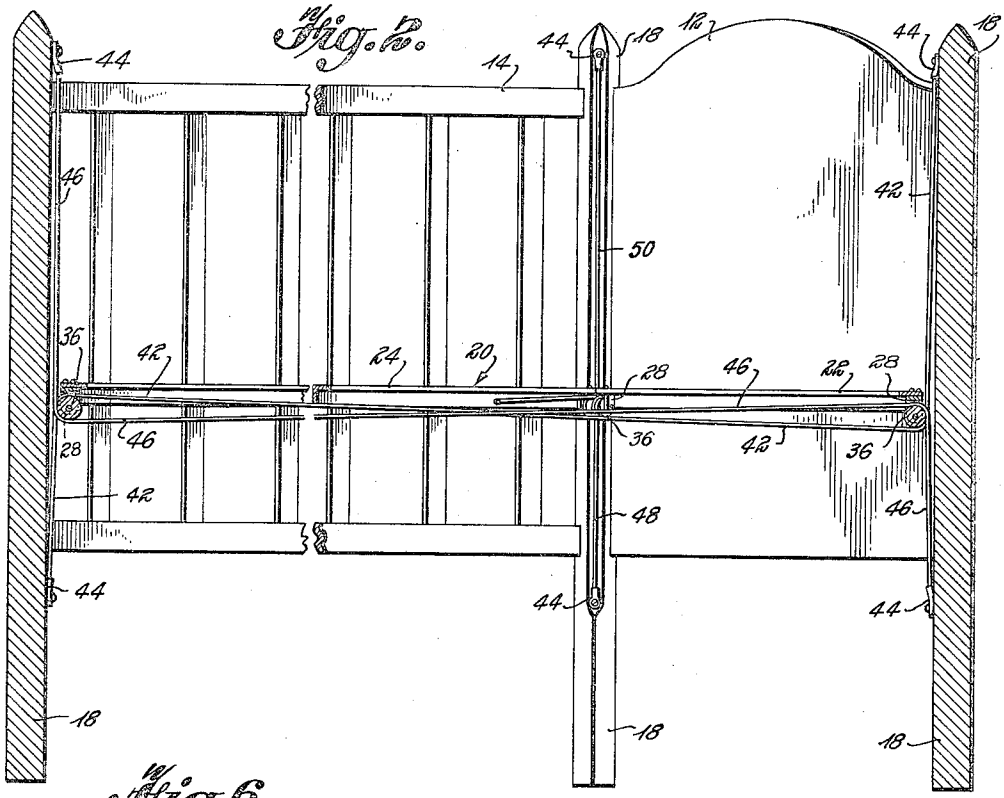


Fig. 6.

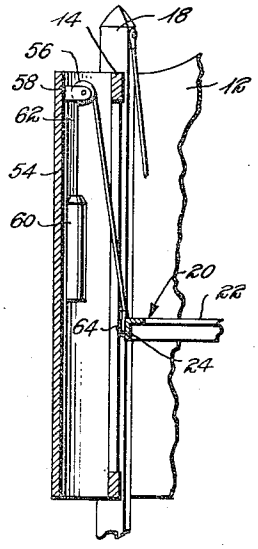


Fig. 7.

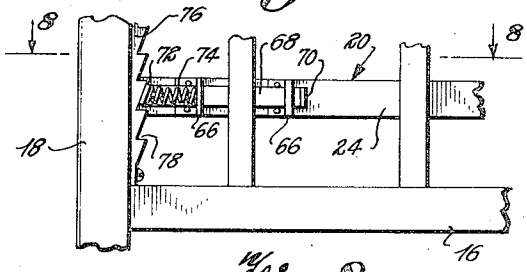
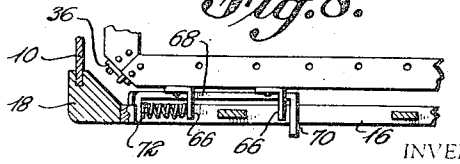


Fig. 8.



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ADJUSTABLE SUPPORT

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Application September 29, 1950, Serial No. 187,553

7 Claims. (Cl. 5—11)

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This invention relates to adjustable supports and particularly to an adjustable mattress support for a crib, bed or the like.

Cribs used for infants are usually provided with upstanding side and end panels extending quite some distance above the mattress to prevent the child from falling onto the floor. This feature of construction renders making or changing the bed quite cumbersome since it is necessary to reach over the side portions to manipulate the bed clothing. Many such cribs are constructed with vertically adjustable spring frames or supports but commonly such frames have to be raised or lowered by manipulating each end individually and the range of adjustment is usually very limited. It has been proposed to construct a crib wherein the spring frame is suspended from cables attached to the corners thereof with all four cables extending to a drum or shaft to be simultaneously wound thereon or unwound therefrom to raise or lower the spring frame. A serious objection to such an arrangement lies in the fact that if for any reason one corner or side of the spring frame is obstructed in its downward movement, the frame and all elements supported thereby will tilt and often then fall or jerk to a lower position.

According to the present invention, a spring frame is mounted for vertical movement within the frame of the crib and it is guided for such movement by a system of crossed cables engaging portions of the spring frame. The arrangement of cables is such that the portions of the frame engaged thereby are enforced to move vertically in unison, that is, one portion cannot move vertically in either direction independently of the other. Such crossed cable arrangements are common in drafting instruments to guide a straight edge in a single plane while enforcing parallel movement thereof.

According to the present invention, such an arrangement of cables is employed extending across one diagonal of the bed frame and an exactly similar cable arrangement is arranged to extend across the other diagonal of the frame, thus insuring parallel and coincident movement of not only all portions of one diagonal but all portions of the spring frame.

It is therefore an object of this invention to provide an adjustable support wherein all portions thereof are restrained to simultaneous, equal vertical movements in the same direction.

It is a further object of this invention to provide a vertically adjustable spring or mattress frame with means to insure uniform movements

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of all parts of the frame without bulky or complicated mechanisms.

It is a further object of this invention to provide means for guiding a spring frame, such means being simple and economical to construct.

It is another object of this invention to provide means for guiding a vertically adjustable spring frame wherein the means are inconspicuous and do not interfere with normal use of the apparatus.

Other objects and advantages will appear to those skilled in the art as the description proceeds in connection with the accompanying drawings, wherein

Fig. 1 is a perspective view of a crib embodying the present invention with portions thereof broken away and portions omitted for clarity of illustration;

Fig. 2 is a vertical sectional view taken across the diagonal indicated by the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary horizontal sectional view taken substantially on the line 3—3 of Fig. 1 with the parts shown on an enlarged scale;

Fig. 4 is a sectional view taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is a perspective view of portions of the apparatus shown in Figs. 3 and 4;

Fig. 6 is a fragmentary vertical sectional view taken on the line 6—6 of Fig. 1;

Fig. 7 is a fragmentary elevational view of a modification of the device shown in Figs. 1 to 6;

Fig. 8 is a horizontal sectional view taken substantially on the line 8—8 of Fig. 7; and

Fig. 9 is a diagrammatic view of a modified cable arrangement that may be used in the present invention.

A preferred form of the present invention is illustrated in Fig. 1 wherein a child's crib consists of a framework having a headboard 10, a footboard 12, side panel structures 14 and 16 and upstanding legs or corner portions 18. The framework of the bed conventionally is assembled to form a relatively rigid structure within which a spring frame 20 is vertically movable. For purposes of the present disclosure, the spring frame 20 is shown merely as an open rectangular frame but it is to be understood that in practice the rectangular frame will support suitable spring means, such as suggested in Fig. 5 at S, to support a mattress or the like or may support a mattress or pad without actually employing springs. Hereinafter the term "spring frame" is employed for convenience but is intended to denote any such equivalent structure. Such structures are conventional and need not be described in detail.

The spring frame 20 may be composed of angle iron frame members 22 and 24 suitably joined at their corners to provide a rigid rectangular frame. The corners of the angle iron members 22 and 24 are preferably cut on a miter, as clearly indicated in Figures 3 and 5, having abutting edges at 26. A U-shaped bracket 28 is arranged with its web portion extending across the abutting edges 26 and in surface engagement with the inner surfaces of the top flanges of members 22 and 24. Suitable bolts, rivets, or the like 30 unite the brackets 28 and angle iron members into a rigid unitary structure. If desired, the webs of brackets 28 may extend farther into the spring frame than shown and thus constitute corner reinforcements. It is to be understood that a bracket 28 is provided at each of the four corners of the spring frame. The depending legs 32 of each of the brackets 28 are provided with aligned openings supporting shafts 34 upon which rollers 36 are mounted. The rollers 36 may be rigid with the shafts 34, which latter may be rotatable in the brackets 28, or the rollers may be loosely mounted on the shafts 34 and the latter fixedly held by brackets 28. As clearly evident from Figs. 3 to 5, the rollers 36 are of such diameter that their outer peripheries project laterally outwardly beyond the diagonal edges 38 of the spring frame. Preferably the legs 18 of the bed frame are beveled as at 40 (see Fig. 3) to define a surface substantially parallel to but spaced from the outer portions of the rollers 36. Likewise, the spring frame 20 is of lateral and longitudinal dimension somewhat less than the inside dimension of the bed frame so that it may be freely vertically movable therein.

The arrangement for guiding the spring frame vertically while insuring simultaneous movement of all portions thereof comprises flexible cables best seen in Fig. 2. A cable 42 is attached at one end to the upper portion of a leg 18 of the bed frame by means of any suitable attachment element 44. The cable is trained downwardly from the attachment 44 along the leg 18, inwardly of surface 40, and then trained about the roller 36 on the adjacent corner of the spring frame. The cable 42 is trained around and under said roller, then diagonally across the spring frame to the roller 36 at the diagonally opposite corner. The cable 42 extends over the top of that diagonally opposite roller and then downwardly to another fitting 44 arranged to hold the other end of the cable 42 fixed to the lowermost portion of the diagonally opposite leg 18 of the bed frame. A second cable 46 is attached at one end, by means of a fitting 44, to the lowermost portion of the first leg 18, then upwardly over the top of the first roller 36, diagonally across the spring frame where it passes under the second or diagonally opposite roller 36, then upwardly to the upper portion of the diagonally opposite leg 18 where its end is fixed by a fitting 44 to the leg 18. The cables 42 and 46, arranged as described in connection with Fig. 2, are maintained under tension and are properly tensioned initially while the spring frame is held in horizontal position. It will be apparent from an inspection of Fig. 2 that if the left hand portion of the spring frame 20 is lifted, the cable arrangement will force the right hand end portion of the frame 20 to move upwardly in unison therewith. By this crossed cable arrangement, the diagonal of the spring frame lying in the plane of Fig. 2 is caused to move at all times parallel to its original or horizontal position. In other words, the cable arrangement prevents tilting of the spring frame about any axis perpendicular to the plane of Fig. 2.

An exactly similarly arranged pair of cables 48 and 50 are connected to the remaining legs 18 of the bed frame and extend across the other diagonal of the spring frame.

Since one pair of crossed cables (42 and 46) prevent tilting of the spring frame about a first axis and the other pair of crossed cables (48 and 50) prevent tilting about another axis angularly related to the first axis, it will be clearly apparent that all portions of the spring frame are compelled to move upwardly or downwardly together, thus maintaining the spring frame horizontal at all times even though the force exerted thereon to cause upward or downward movement be applied at only one point on the periphery of the frame.

Fig. 1 shows a suitable handle 52 fixed to one side of the spring frame 20 and extending outwardly through the side panel 16 where it is readily accessible for lifting the frame 20 or for lowering the same. The handle 52 may be of any suitable design or construction and need not be of the form shown in the drawings.

The arrangement thus far described provides for vertically guiding a spring frame and provides means for imparting force to the frame to cause vertical movement. Other means must be provided to prevent the frame falling to its lowermost position under the influence of gravity when the handle 52 is released. To this end, a counterbalance as shown in Fig. 6 may be provided. A protective housing of any suitable design, as indicated at 54, may be attached to a side panel 14 and have attached thereto a pulley 56 mounted in a bracket 58 carried by the housing 54. A counterweight 60 suspended by a cable 62 trained over pulley 56 and fastened to the spring frame 20, as at 64, is effective to counterbalance the weight of the spring frame and may be sufficiently large to counterbalance the weight of a mattress in addition to the spring frame and even the weight of an infant thereon. With such a counterbalance as shown at 60, the inherent friction in the rollers 36 and cable system will normally maintain the frame 20 and its load in whatever vertical position it is placed. As an additional feature, suitable brake or latch means may be provided to cooperate with the spring frame and bed frame to insure holding the adjustable frame 20 in any desired position.

Clearly, a gravity actuated counterweight such as 60 may be replaced by any other suitable counterbalance, such for instance as a spring counterbalance of the type commonly employed to counterbalance the weight of vertically movable window sash.

As an alternative to a counterbalance of the weight or spring type, or in addition thereto, the bed may be provided with some such means as shown in Figs. 7 and 8. Fig. 7 shows a spring frame 20, similar in all respects to that described in connection with Figs. 1 to 6 but having a pair of angle brackets 66 riveted or otherwise affixed to one side thereof. The angle brackets 66 are provided with aligned openings through which a latch member 68 slidably extends. The latch member 68 is provided with a laterally bent end portion 70 constituting a handle and a laterally bent opposite end portion 72 constituting a detent. A spring 74 extends between one of the brackets 66 and the detent 72 to urge the latch member 68 to the left as seen in Figs. 7 and 8.

A ratchet bar 76 is fixed to a face of an adjacent leg 18 of the bed frame and is provided with vertically spaced shoulder portions 78 upon which the detent is adapted to rest and support the weight of the spring frame 20. It will be obvious that by grasping the handle 70 of the latch 68 and withdrawing the latch to the right as seen in Figs. 7 and 8, the handle 52 may be grasped and the spring frame 20 freely moved upwardly or downwardly to the desired position and upon release of the latch 68, the spring frame 20 will be held in that position.

It will be clear that any of a multitude of equivalent counterbalancing or latching arrangements may be provided to sustain the weight of the frame 20 or any load placed thereon in the desired position of adjustment. Likewise, such a latching arrangement as shown in Figs. 7 and 8 may be arranged to be actuated from a position adjacent the handle 52 or even by the handle.

While elements 42, 46, 48 and 50 have been described as "cables," it is to be understood that any suitable flexible element may be employed such for instance as braided or twisted metal rope, fiber rope, or thin metallic or other ribbons capable of withstanding the tension required for proper operation.

The rollers 36 may be of such diameter that the cables or ribbons 42, 46, etc., at all times lie snugly against the beveled surface 40 of leg 18 or the rollers may be provided with radially extending flanges adapted to roll on the surface 40.

Fig. 9 diagrammatically illustrates a modified cable arrangement suitable for guiding a spring frame, indicated in that figure as 20'. In this arrangement, a cable 80 is attached at one end to one corner A of the spring frame and is trained upwardly and over a pulley 81, then downwardly and over a pulley 82, then diagonally across the bed frame to a pulley 83 and upwardly where its other end is fastened to the diagonally opposite corner B of the spring frame 20'. A second cable 84 has one end attached to the corner B of the spring frame and extends upwardly over a pulley 85, then downwardly over a pulley 86, then diagonally across the bed frame to a pulley 87 over which it is trained to extend upwardly to the corner A of the spring frame, to which its other end is attached. The pulleys 81, 82, 83, 85, 86 and 87 are all mounted on upstanding corner portions or legs (not shown) of a suitable bed frame or the like. The bed frame structure including such legs has been omitted from Fig. 9 for clarity of illustration.

It will be readily apparent that enforced upward movement of the corner A of spring frame 20' will pull upwardly on the adjacent end of cable 84 thus applying an equal upward force to the diagonally opposite corner B of the spring frame. In like manner, an upward force applied to the corner B of the spring frame will act through cable 80 to apply an equal upward force to the corner A of the spring frame. In the event an obstruction engages a corner of the spring frame during its downward movement, the cable extending downwardly therefrom will be thrown into tension to either force the frame past the obstruction or to restrain the diagonally opposite corner from downward movement.

An exactly similar pair of cables 88 and 90 is arranged across the other diagonal of the frame and operates in exactly the same manner as that described to insure simultaneous vertical movement of the corners C and D of the frame 20'. This arrangement is alternative to that described

in connection with Figs. 1 to 8 and may be substituted therefor if desired. The cables 80, 84, 88 and 90 need not be caused to extend diagonally across the bed frame but may be trained around the periphery of the bed frame if it is desired to retain the space therein free for storage or other uses. The term "crossed cable parallel motion means" is intended to include both the Fig. 2 and Fig. 9 cable or ribbon arrangements described and consisting of the pair of cables arranged on either diagonal of the frame, and other equivalents thereof.

While the cable arrangement of Figs. 1 to 6 and that of Fig. 9 are shown and described as extending across the diagonals of the spring frame, it is to be understood that each pair of cables may be arranged in any vertical plane angularly related to the vertical plane of the other pair even though they are not on the frame diagonals. For instance, one pair of cables could be arranged in a vertical plane parallel to but between the end panels 10 and 12 with the other pair of cables arranged parallel to but between the side panels 14 and 16. As another alternative, each pair of cables could be arranged in a plane extending laterally across the bed frame and intersecting both side panels or end panels as long as the two planes are angularly related.

Cribs of the type shown are customarily constructed for ready disassembly whereby the parts may be arranged to occupy a minimum space for storage or shipping. Screws 100 extend through the legs 18 and are threadedly received by the ends of side panels 14 and 16 to hold the frame in a substantially rigid assembled relationship. When it is desired to disassemble a bed constructed according to the present invention, it is only necessary to remove the screws 100 and panels 14 and 16, whereupon the end panels 10 and 12 along with the legs 18 may be readily swung about the end edges of the spring frame 20 and folded to a position against the bottom of the spring frame, thus forming a relatively compact arrangement for storage or transportation. Upon disassembly and folding in the manner proposed, it will be apparent that the cables need not be disconnected from the end structures or the spring frame since folding of the end structures in the manner described will not disturb the cable rigging. In fact, the folding may be accomplished without altering the tension in the cables.

A further possible manner of raising and lowering the spring frame would be to provide a crank, preferably journalled on the frame and having cable or like connections to the movable spring frame whereby rotation of the crank would result in raising or lowering movement of the spring. Suitable ratchet or brake means could be arranged to cooperate with the crank or crankshaft to lock the spring frame in its adjusted position.

It will be evident that the rollers 36 as described and the flat surface 40 of the leg 18 could be modified so as to provide two grooved pulleys of narrow width at each corner of the spring frame. Such pulleys would preferably be arranged in vertically spaced relation, that is, one above the other, and could extend into a vertical groove in the surface 40 to thereby conceal the upwardly and downwardly extending portions of the cables.

While a limited number of specific embodiments have been shown and described, it is to be understood that the invention is not limited

thereto but encompasses all modifications falling fairly within the scope of the appended claims.

I claim:

1. A structure comprising, a frame having horizontally spaced upstanding portions, a support arranged to move vertically between said upstanding portions, first means connected to said upstanding portions and said support and arranged to guide said support for substantially vertical movement while preventing tilting thereof about a first substantially horizontal axis, second means also connected to said upstanding portions and said support and preventing tilting thereof about a second substantially horizontal axis angularly related to said first axis.

2. A structure comprising, a frame having horizontally spaced upstanding portions, a support arranged to move vertically between said upstanding portions, first crossed-cable parallel motion means connected to said upstanding portions and said support and arranged to guide said support for vertical movement while preventing tilting thereof about a first substantially horizontal axis, second crossed-cable parallel motion means also connected to said upstanding portions and said support and preventing tilting thereof about a second substantially horizontal axis angularly related to said first axis.

3. A structure comprising, a rectangular frame having upstanding corner portions, a rectangular support arranged substantialy horizontally within said frame for vertical movement between said upstanding corner portions, a first pair of elongated flexible elements, each of said elements being attached at one end to the upper portion of one of diagonally opposed upstanding corner portions, each of said elements extending downwardly into engagement with an adjacent corner of said support then diagonaly thereacross then downwardly and being attached to the lower portion of the diagonally opposite corner portion, said elements being guided for longitudinal movement relative to said support along the same diagonal thereof, and a second pair of flexible elements arranged similarly to said first pair but extending across the other diagonal of said rectangular frame to thereby guide said support for vertical movement and maintain said support always substantially horizontal.

4. A structure comprising, a rectangular frame having upstanding corner portions, a rectangular support arranged substantially horizontally within said frame for vertical movement between said upstanding corner portions, a first pair of elongated flexible elements, each of said elements extending to and cooperating with diagonally opposed portions of said support and corresponding diagonally opposed upstanding corner portions and arranged, when one of said portions of said support is moved vertically, to compel an equal vertical movement, in the same direction, of the diagonally opposed portions of said support, and a second pair of flexible elements arranged similarly to said first pair but extending to and cooperating with the other diagonally opposed portions of said rectangular frame and support to thereby guide said support for vertical movement and maintain said support always substantially horizontal.

5. A bed structure comprising, a rectangular frame having vertically extending corner portions, a substantially rigid rectangular mattress support arranged within said frame for vertical movement between said upstanding corner portions, rollers at the corners of said mattress support, two crossed-cable parallel motion means connected to said vertically extending corner portions and trained over said rollers, one of said means arranged to compel equal vertical movements of one diagonal of said support and the other of said means arranged to compel equal vertical movements of the other diagonal thereof when any portion of said mattress support is caused to move vertically.

6. A bed structure comprising, a frame having horizontally spaced vertically extending portions, a support arranged within said frame for vertical movement between said vertically extending portions, two crossed-cable parallel motion means arranged to guide said support vertically with respect to said vertically extending portions, each of said crossed-cable means being arranged in a substantially vertical plane angularly related to the plane of the other, and means operative to at least partially sustain the weight of said support throughout its range of vertical movement.

7. A bed structure comprising, a frame having horizontally spaced vertically extending portions, a support arranged within said frame for vertical movement between said vertically extending portions, two crossed-cable parallel motion means arranged to guide said support vertically with respect to said vertically extending portions, each of said crossed-cable means being arranged in a substantially vertical plane angularly related to the plane of the other, and means carried by said support and extending outwardly of said frame whereby said support may be manually moved to different vertical positions.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
322,645	Schlichting	July 21, 1885
1,040,795	Skeffington	Oct. 8, 1912
1,682,577	Littlefield	Aug. 28, 1928
1,710,823	Hackney	Apr. 30, 1929
2,410,628	Brunette	Nov. 5, 1946
2,448,317	Lineberry	Aug. 31, 1948
2,560,928	Bockius	July 27, 1951

FOREIGN PATENTS

Number	Country	Date
2,005	Great Britain	of 1794
15,903	Great Britain	of 1913