

April 13, 1954

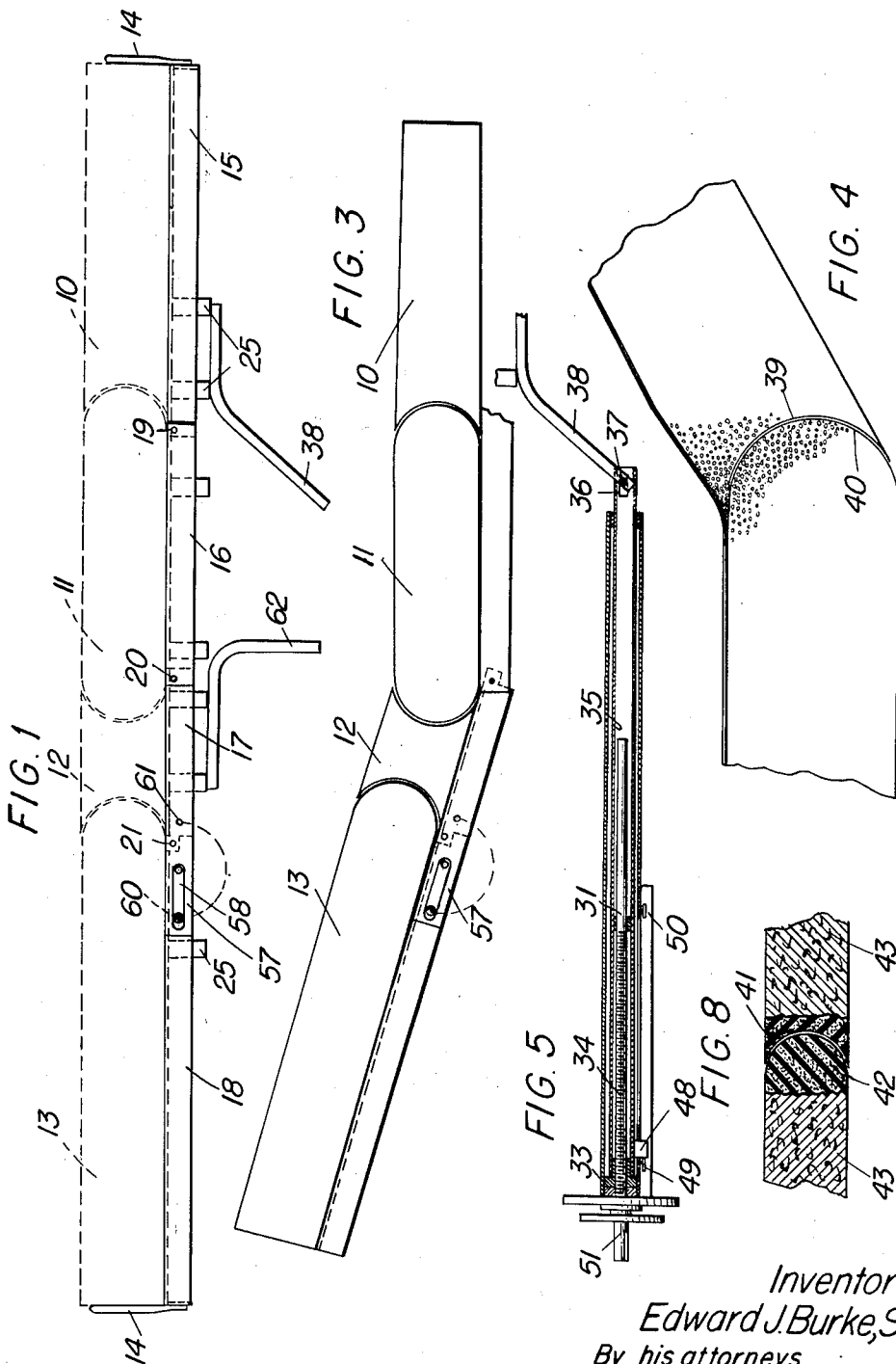
E. J. BURKE, SR

2,674,745

ARTICULATED MATTRESS AND BED

Filed June 15, 1951

3 Sheets-Sheet 1



Inventor
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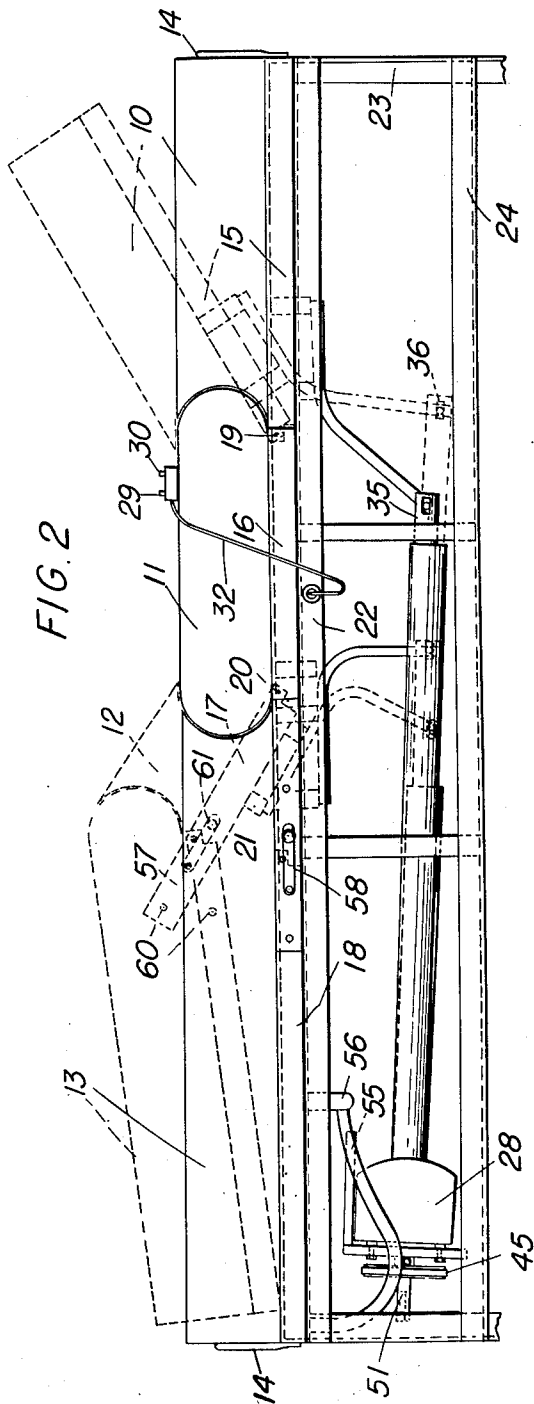
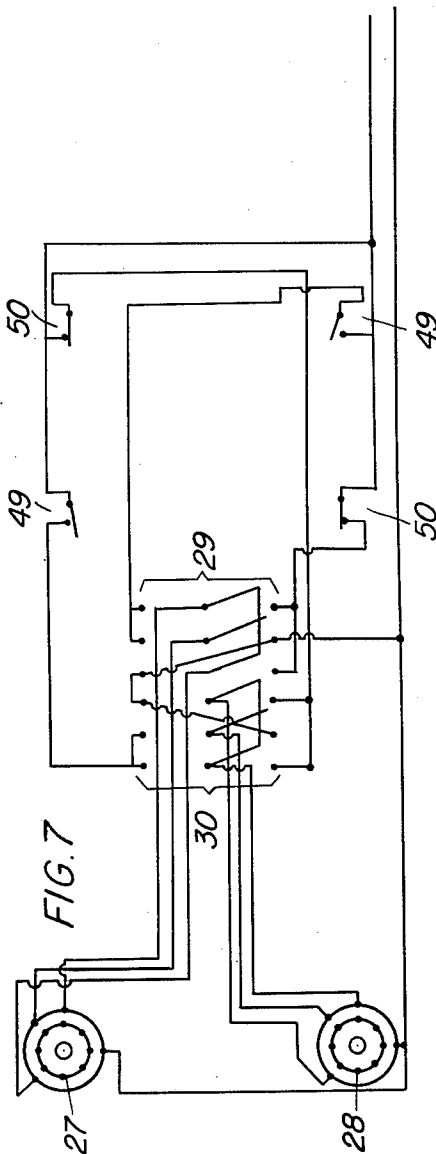
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3 Sheets-Sheet 2



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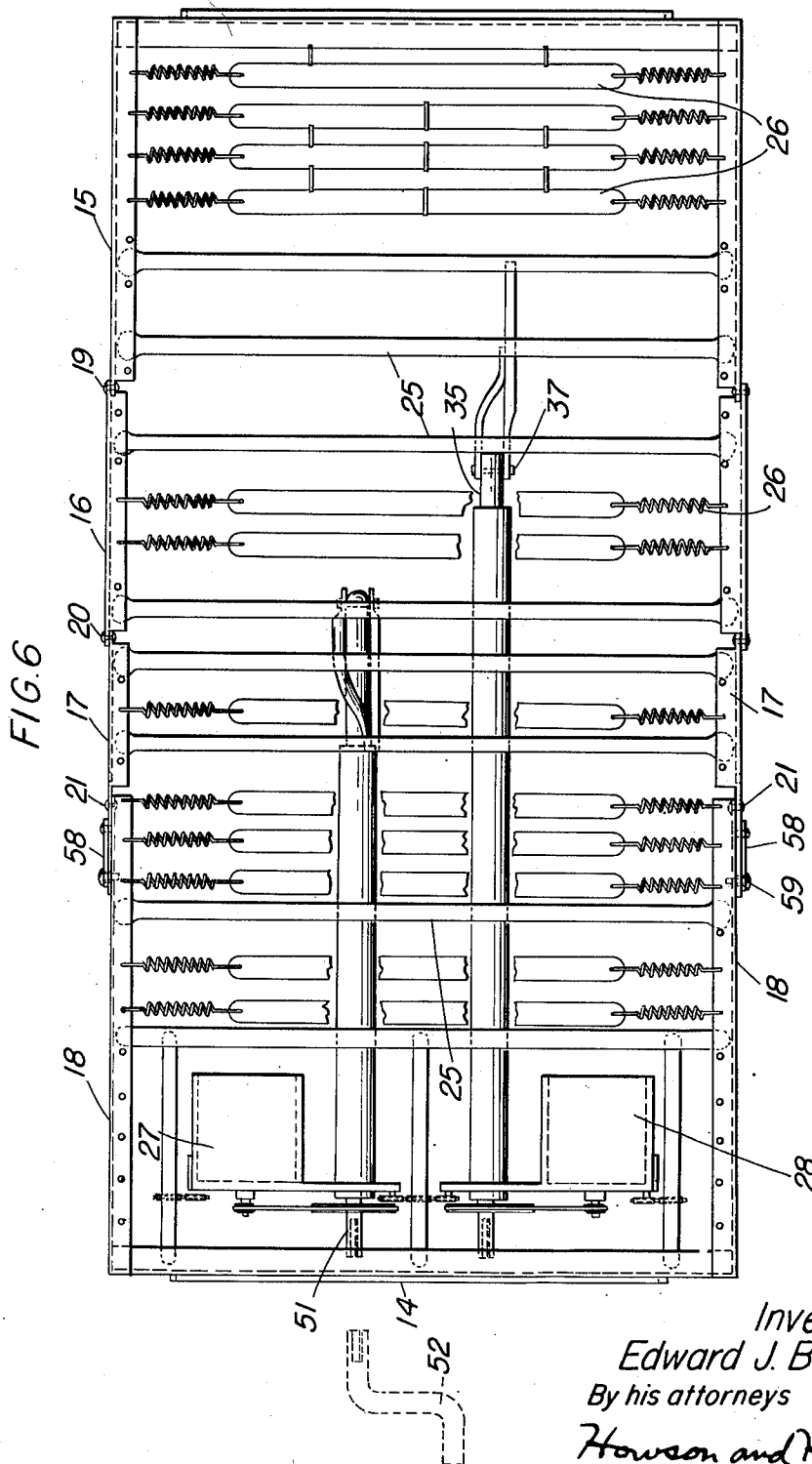
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ARTICULATED MATTRESS AND BED

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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ARTICULATED MATTRESS AND BED

Edward J. Burke, Sr., New Rochelle, N. Y.

Application June 15, 1951, Serial No. 231,713

6 Claims. (Cl. 5—69)

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This invention relates to a mattress having a plurality of sections and an articulated bed with which the mattress is coordinated to move in such manner as not to disturb the bedding when sections of the spring and the mattress are tilted. In a hospital bed in which the spring and mattress are divided transversely into sections and the head and foot sections are adapted to be tilted with relation to the rest of the bed, the tilting has heretofore caused separation or jamming of the mattress sections with dislocation of the bedding. The object of my invention is to provide an articulated mattress and bed which will avoid separation or jamming of the mattress sections because of tilting of the sections. It is characteristic of my invention that the adjoining surfaces of adjacent edges of the mattress form a concavo-convex joint and that means are provided to keep the sections from separating. I prefer to make the adjacent edges of the sections of sponge rubber.

This application is a continuation-in-part of my application Serial No. 160,793, filed May 8, 1950, entitled Articulated Mattress With Means To Secure the Same to a Bed, and now abandoned.

In the drawings:

Fig. 1 is a view in side elevation of a four section mattress and part of a bed therefor all made in accordance with my invention;

Fig. 2 is a view in side elevation of the mattress and entire bed except the feet of the embodiment of Fig. 1, the head and thigh sections of mattress and bed being shown elevated in the dotted line showing;

Fig. 3 is a view in side elevation of the mattress and part of the spring of Fig. 1 with the thigh and foot sections elevated as a rigid unit;

Fig. 4 is a view on an enlarged scale of the concavo-convex joint between the head and middle sections of the mattress of Fig. 1 when the head section is elevated;

Fig. 5 is a view in side elevation partly in section of the screw and tubes for raising the head section of the bed of Figs. 1 to 3;

Fig. 6 is a plan view of the springs and power unit of the bed of Figs. 1 to 5;

Fig. 7 is a wiring diagram of electric circuits for the beds shown in Figs. 1 to 6;

Fig. 8 is a cross-sectional view of a modified form of mattress joint.

Referring to the drawings, I have shown the mattress divided transversely into four sections. These are a head section 10, a middle or stationary section 11, a short thigh section 12 and a foot section 13. These sections are preferably

but not necessarily made of foam rubber. In order that tilting of one mattress section with relation to another shall not result in opening up a space or separation of the sections at the bed surface or elsewhere or in causing them to hump up, either of which movements would disturb the bedding and the occupant of the bed, I construct the mattress and bed as hereinafter described. The adjacent surfaces of the ends of the mattress sections are curved so as to make concavo-convex joints. I have found that the sections can be prevented from separating in the most simple manner by providing retaining bars 14 at the head and foot of the bed. These cross bars are carried by the end spring sections so that the retaining bars' relation to the mattress sections is unchanged when the sections are tilted. The sections of the spring correspond to the mattress sections. Thus, the head spring section 15 underlies mattress section 10, the middle spring section 16 underlies mattress section 11, the thigh spring section 17 underlies the thigh mattress section 12, and the foot spring section 18 the foot mattress section 13. The spring sections are hinged together at each side of the bed on horizontal axes. These pivot points are designated 19, 20 and 21 for the head to middle, middle to thigh and thigh to foot pivots. Underneath the springs section is a rectangular frame 22 to support the spring, this being preferably made of angle iron as are the frames of the springs. The vertical legs of the frame are designated by the number 23 and a rectangular lower brace 24, all around the bed, may be provided if desired. I have shown transverse pipe members 25 joining the two sides of each spring section there being two such members welded across each of the sections 15, 16, 17 but only one across the foot section 18. There also are spring members 26 across the spring to provide support for the mattress.

Any suitable means may be employed to raise and lower the sections of the mattress and bed which are to be tilted. Since the raising and lowering means are not claimed herein, they will be described only in general terms. They are claimed in the application of Herbert Fuhrer entitled "Invalid Bed," filed of even date herewith.

I propose to tilt the head section of the mattress and spring using one power unit for this purpose and I propose to tilt both the thigh and foot sections of the mattress and spring by a second similar power unit. These power units are electrically driven but an emergency handle

52 can be provided for use on stub end 51 of the screw in case of power failure (Fig. 1). The power unit for the head sections of mattress and spring has a master screw 31 driven by a motor 28 at the foot of the bed. The foot power unit has a separate motor 27. These motors controlled by double throw, double pole master switches 29, 30 located in any desired position. Switch 29 controls the foot power unit and switch 30 the head power unit. I have shown them on cords 32 so that they can be placed on the bed or elsewhere. The master screw of each unit has fine threads 33 on it—say nine to fourteen threads to the inch. On these is a collar 34 fastened on the end of a tube 35 extending toward the head of the bed. At a point approximately under the pivot point 19 between the head section and middle section of the spring this inner tube 35 terminates and is joined to a bent arm 38 by a pin 37 lying in slots 36 in the tube. This arm 38 is bent forward and is welded to the under side of the two transverse tube members 25 of the head spring section. When the rotation of the master screw drives the inner tube 35 toward the head of the bed, the head mattress section 10 is tilted up. The other power unit is somewhat shorter and terminates almost under the pivot point 20 between the middle and thigh spring sections. It is connected to the thigh section 17 by a backwardly bent arm 62. The connections are such that the thigh spring section 17 and the thigh mattress section 12 are tilted about the pivot point 18 with the middle section when the master screw 31 of this power unit is retracted toward the foot of the bed.

In order that the motors which raise and lower the tilted sections of the mattress and spring may not push the sections too far, I provide limit switches 49, 50 (see Figs. 5 and 7). These are actuated by a fin 48 secured to the inner tube 35 as shown in Fig. 5. The fin comes in contact with a limit switch at either end of the operating stroke thereby braking the electric circuit and stopping the motor. This prevents the sections of the bed being raised beyond the desired maximums and brings the power unit to a stop when the bed section has been returned to its normal position. By examination of Fig. 7, it will be seen that braking of the circuit by a limit switch prevents turning of the electric motor only in that one direction. Movement in the opposite direction is still attainable by throwing the three-way master switch to the opposite side. When there has been movement in that opposite direction, the limit switch is thereby reset.

Referring now to the joints between the mattress sections, it will be noted that the edge 39 of the head section 10 adjacent the middle section 11 is curved concavely and cooperates with a complementary convex curve 40 on the edge of the middle section. Each curve is drawn about a center which lies in the horizontal mid-plane of its section of the mattress. In this way, the concavo-convex joint is such that the two surfaces will move about each other and remain in close association or substantial contact when a mattress section is swung up or down about the line of juncture (see Fig. 4). If, owing to the weight of the person in the bed, the upper faces of the mattress section are compressed to the point where they cannot slide, the upper part of the concave surface will compress as shown in Fig. 4. I prefer to cover the surfaces of the

joints, i. e., at the abutting ends of the sections, with smooth surface sheeting. One example of such material would be rubber sheeting. The covering makes it easy for the surfaces to slide on each other.

All these desirable characteristics at the joints can be obtained in the modified form shown in Fig. 8. However, only the abutting ends 41, 42 of the sections are made of sponge rubber and the rest can be made of hair 43 or any other desired material.

As shown in Figs. 2 and 3, the thigh and foot mattress sections 12 and 13 can be given either of two elevated positions. In Fig. 2, the foot power unit has tilted the thigh section of the mattress about the pivot point between the middle section 16 and the thigh section 17 of the spring and the foot mattress section 13 follows the elevation of the rear edge of the thigh mattress section 12 to its new raised level. However, the foot section 13 of the spring section 13 has pivoted about the pivot point 21 between it and the thigh spring section so that the feet of the foot sections are still reset on bottom. The elevation of the pivot point 21, however, draws the lower ends to the right as shown in Fig. 2, i. e., toward the head of the bed, but a retaining bar 14 at the foot of the bed keeps the foot section of the mattress in contact with the thigh section. It will be observed that my concavo-convex joint is admirably adapted to cooperate in this movement without causing separation between the sections. It should also be observed that whether the movement at one of my concavo-convex joints involves a raising of the joint or a raising of one of the two mattress sections without raising the joint, solid support for the occupant of the bed and the bedding is supplied at all times and at all points adjacent the joint. This is an important feature both for the comfort of occupant of the bed and keeping the bedding straight, for if there were any hollow underneath the surface above the spring, an impression would immediately be made on the mattress.

In Fig. 3 the other formation obtainable is shown while in Fig. 2 the hinged elevation of the thigh and foot elevates the knees of the occupant of the bed and this is a very useful position. It is sometimes desirable to elevate the entire legs in a straight line. In this case, the thigh and mattress section are elevated as a rigid unit as shown in Fig. 3. For this purpose, I provide a plate-like extension 57 extending past the pivot point 21 between thigh and foot sections toward the foot of the bed. Such extension is provided on each side of the bed vertically and locks close to the vertical bed of the angle iron forming the side of the bed. The extension 57 lies beside the frame of the foot section and in turn has mounted at its outer face, a short steel band 58. This band is pivoted on the plate-like extension between the pivot point 21 and the end of the extension and there is a hole in the inner end of the plate-like extension when the band is swung toward the end of the extension and a pin placed through it and the hole in the extension. The pin can also pass into a hole 60 in the frame of the foot section if the thigh and foot sections are parallel as shown in Figs. 1 to 3.

What I claim is:

1. A mattress for an articulated bed comprising a plurality of closely adjacent independent mattress sections of the same thickness and of substantial width adapted to be held in end-to-end

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abutting relation, the facing surfaces of adjacent sections being complementally curved to provide a concavo-convex joint extending substantially the full thickness of said sections, whereby the joint may remain closed and said sections may remain closely adjacent during relative angular movement of the sections to maintain a substantially smooth uninterrupted bed surface.

2. A mattress for an articulated bed according to claim 1 in which the abutting ends of the mattress sections are formed of sponge rubber whereby the joint can adapt itself to the weight of the occupant.

3. A mattress for an articulated bed according to claim 2 in which the surfaces of the joints are covered with smooth, flexible, frictionless surface sheeting to facilitate sliding when one or both of the sections are inclined.

4. An articulated mattress and bed in which the mattress comprises a plurality of independent sections of the same thickness and of substantial width, the facing surfaces of adjacent sections being formed to provide a concavo-convex joint, the surfaces being closely adjacent for a length commensurate with the depth of the adjacent mattress sections, the curvature of said surfaces being complementary and such that the joint remains closed and the bed surface uninterrupted when the inclination of the mattress sections is changed, and a spring in said bed having sections corresponding to the mattress sections but hinged together, in combination with retaining means on the spring sections at the foot and head of the bed adapted to keep the mattress sections in contact regardless of the inclination of the end sections.

5. A mattress for an articulated bed comprising a plurality of closely adjacent independent mattress sections of the same thickness and of substantial width adapted to be held in end-to-end

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abutting relation, the facing surfaces of adjacent sections being curved in a parallel manner to provide a concavo-convex substantially closed joint at at least one point in the mattress extending the full thickness of said sections, said sections having flat upper surfaces up to the joint, whereby during relative angular movement of the sections a substantially smooth uninterrupted bed surface is obtained at the joint.

6. A mattress for an articulated bed comprising a plurality of closely adjacent independent mattress sections of the same thickness and of substantial width adapted to be held in end-to-end abutting relation, the facing surfaces of adjacent sections being free to move relatively to each other and complementally curved about a center of arc of curvature located in the horizontal mid-plane of the mattress to provide a closed concavo-convex joint at at least one point in the mattress, whereby when the relative angle of two sections so related is changed by one facing surface moving relatively to the other, the mattress provides uninterrupted solid support adjacent the joint.

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