

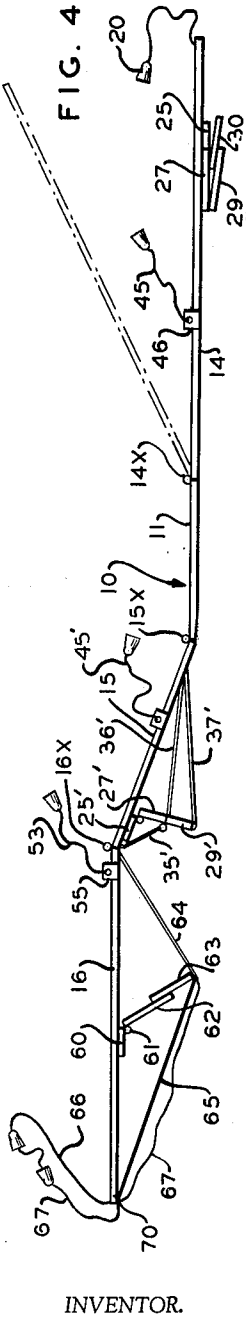
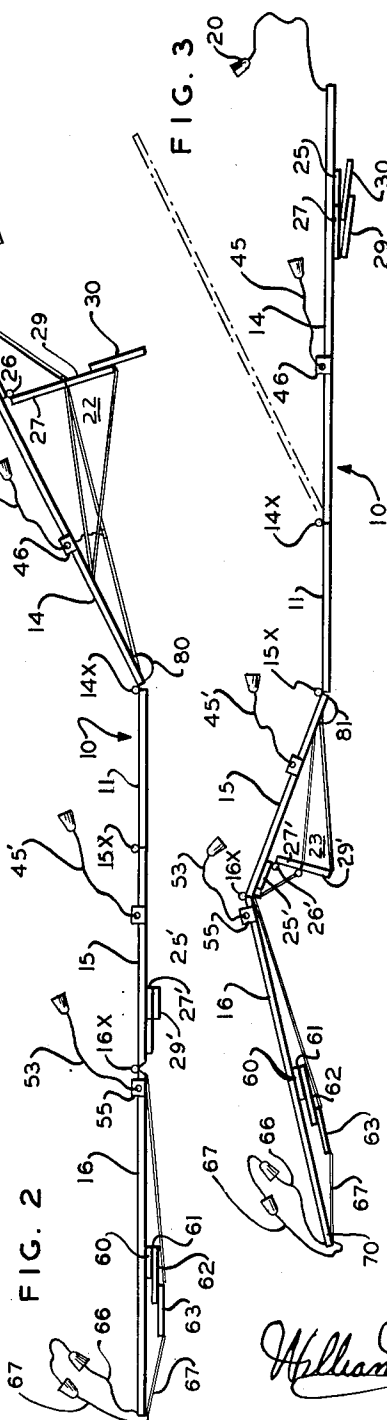
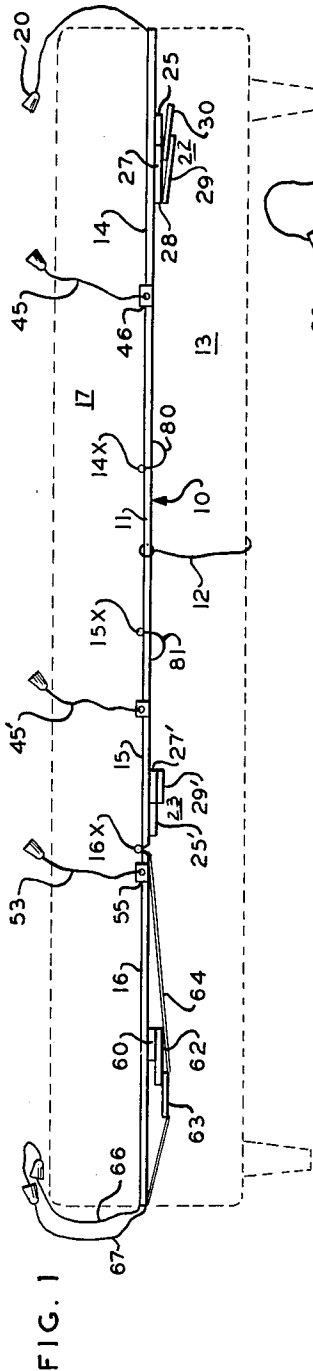
April 30, 1963

W. M. EMERY
BED BOARDS

3,087,170

Filed Jan. 23, 1961

2 Sheets-Sheet 1



INVENTOR.
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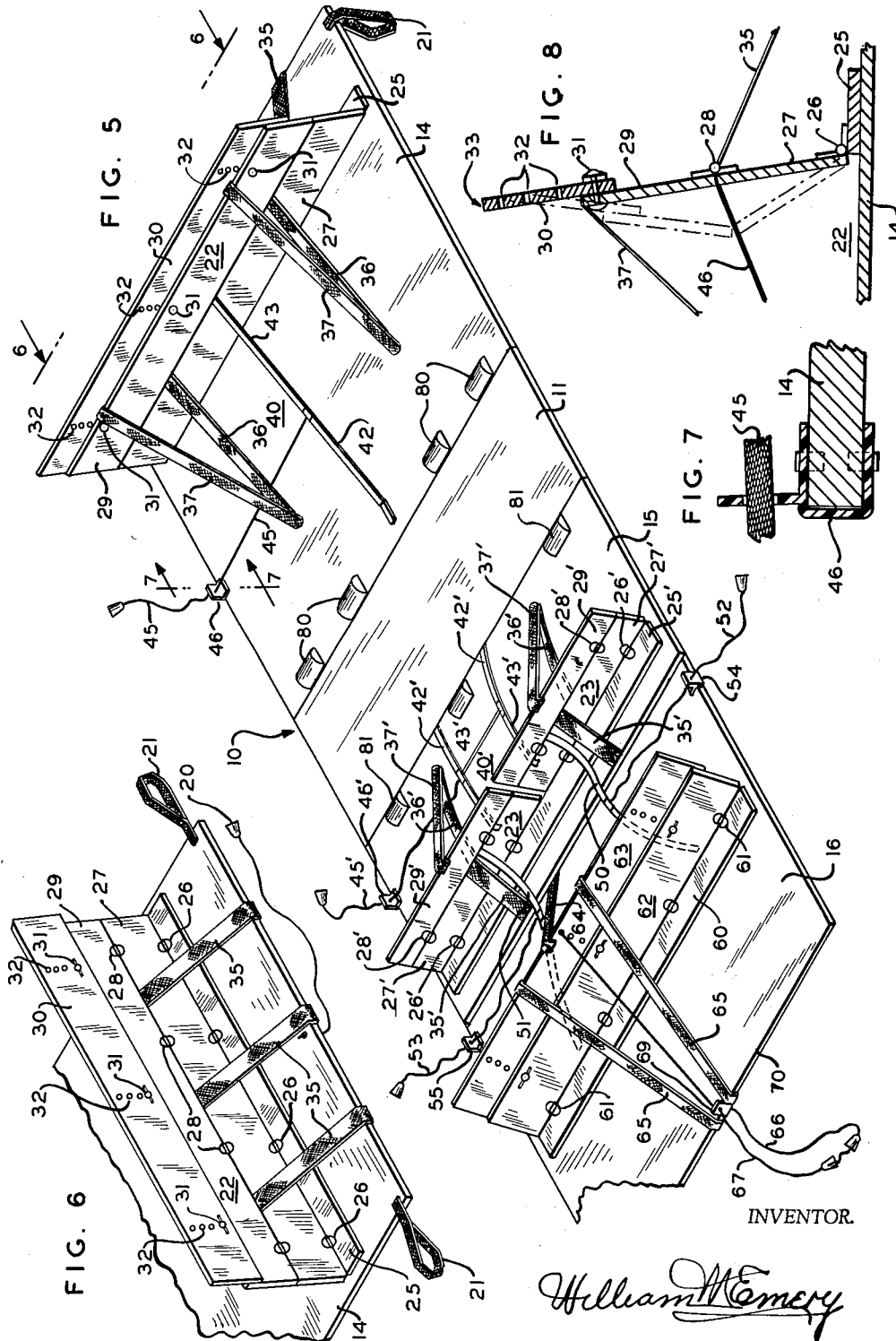
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2 Sheets-Sheet 2



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3,087,170
BED BOARDS
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4 Claims. (Cl. 5—327)

My present invention refers to a novel bed board such as might be positioned between a mattress and its conventional support to overcome the disadvantages of oversoft or misshapen mattresses.

Objects include the providing of such a bed board with hinged segments and novel, collapsible, flatfolding supports to provide optional elevation of head and trunk, or knees, or the feet and further providing novel control means to trip said collapsible supports to lower them, similar to means mounted to provide a mechanical advantage to facilitate the elevation of said segments operable from an in-bed position as well as an out-of-bed position and by these and other means to make said board practically automatic in many respects while retaining the basic characteristics of conventional bed boards, including particularly flatness and thinness. Another object is to provide means to use the weight of the occupant to facilitate the actuation of the segments.

These and other objects will be obvious from the specification of my construction, obvious variations thereof, claims and drawings which follow in which:

FIG. 1 shows in elevation my bed board positioned flat like a conventional board in a conventional bed,

FIG. 2 shows in similar elevation my bed board with the head elevated, it being assumed in this view and the subsequent two that as in FIG. 1 a suitable mattress is resting on my bed board and the board is supported by conventional means,

FIG. 3 is a similar side elevation with the knee supporting segments elevated,

FIG. 4 is a like side elevation, but with the foot and knee segments both elevated,

FIG. 5 is an isometric plan view of the under side of my bed board, turned over and resting on a flat surface,

FIG. 6 is an end elevation thereof as viewed from 6—6 on FIG. 5,

FIG. 7 is a sectional view from 7—7 in FIG. 5, and FIG. 8 is a sectional view from 8—8 in FIG. 5.

My novel bed board 10 is constructed basically of four segments hinged together, and includes the shortest segment 11 tied in place by a cord 12 which passes around the conventional bed springs 13. Hinged at 14X to segment 11 is the longest segment 14 for the angular elevation of the head and trunk. At 15X is hinged a knee elevating segment 15 and at 16X a foot elevating segment 16 is hinged to segment 15. These articulated segments are shown flat in FIG. 1 between a conventional mattress 17 and bed springs 13 (neither 13 nor 17 being part of my invention), and have in this position all the benefits and conveniences of a conventional bed board. If, however, user of such a bed board desired an elevated or inclined position for reading or comfort, he can then, while in a sitting position, pull on control cord 20 and thereby raise head segment 14 to the angle shown in FIG. 2, or if preferred head segment 14 can be raised from an out-of-bed position by lifting on either of straps 21 (FIGS. 5 and 6).

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As soon as either segment 14 or 15 is sufficiently raised, novel collapsible double jointed spring actuated supports or legs 22 and 23 respectively straighten themselves to support the respective segments. Supports 22 and 23 are similar except 22 extends substantially the full width of board 10 whereas 23 is composed of two similar collapsible supports, each extending half way across the width. Similar parts in 23 are designated with a prime sign.

Supports 22 and 23 include a transverse slat 25 and 25' respectively fixed to board 10 and hinged by hinges 26 and 26' respectively to upper support 27 and 27' respectively which is hinged by hinges 28 and 28' respectively to lower support 29 and 29' respectively to which in extension 30 is adjustably attached by means of bolts 31 and a series of optional holes 32.

Hinge 26 might be compared to the hip joint hinging the leg to the body, and hinge 28 is comparable to the knee joint and point or lower edge 33 to the foot. When one stands at attention the knee is stiff because it has passed beyond the center line of the hip and the foot. If someone pushed the knee joint forward from the rear beyond the dead center line, then the whole leg would tend to collapse if it were the sole support of the bodily weight.

Assisted by gravity, these parts 26 to 30 and 26' to 29' are actuated by elastics 35 and 35' respectively one end of which is anchored to board 10, and the other optionally to 27 or 29 and 27' and 29' respectively substantially in alignment with the axes of hinges 28 and 28'. A non-elastic stop of tie 36 or 36' is similarly anchored but opposed thereto. A second non-elastic stop or tie 37' and 37' runs from 10 to the outer edge of lower support 29 and 29' and in the case of 22 in such a manner as not to be effected by the adjustable positioning of extension 30 already described. Stops 36 and 37 and 36' and 37' respectively are of such lengths and anchored in such a manner as to provide when made taut by elastic 35 and 35' respectively and when supports 22 and 23 are supporting weight, that hinges 28 and 28' respectively shall be just past a dead center condition with the adjacent edges of 27 and 29 and 27' and 29' respectively in abutment, as shown in FIG. 8.

These support legs 22 and 23 are tripped by a novel mechanism which I call a tension toggle 40, and 41' consisting of a normally substantially straight tension strap having two parts or legs 42 and 43 and 42' and 43'. Straps 42 and 42' being attached to the board 10 and straps 43 and 43' attached in line with the axes of hinges 28 and 28'. Cords 45 and 45' are attached near the union of the tension straps 42 and 43 and 42' and 43' respectively so that when cord 45 is pulled a toggle action results that applies a mechanically amplified force to pull hinges 28 and 28' sufficiently out of its dead center position so that the resultant force from the weight being supported by the support is sufficient to overcome the pull of elastics 35 and 35' so that the supports 22 and 23 will collapse flat against the under side of board 10. Cords 45 and 45' are guided by extruded plastic brackets 46 and 46'. Twin supports 23 each require two tension straps 42' and 43', but these are joined and operated by one cord 45' so that they may be tripped to collapse in unison.

Twin supports 23 are subject to automatic actuation by elastics 35' as soon as the hinge point 16X is elevated but a novel application of my tension toggle which

is used to simultaneously raise segment 15 and also apply amplified forces to supplement the force stored in elastic 35'. FIG. 5 shows a right and left tension toggle each with tension straps 50 and 51 and pulled by cords 52 and 53 guided by extruded pieces 54 and 55.

When the bed board 10 is in the position shown in FIG. 1, and cords 52 and 53 are pulled upward, the board at hinge 16X tends to be lifted with the same force as if cords 52 and 53 were directly attached to the board near the hinge, plus the additional resultant of forces incident to each tension toggle acting on leg parts 27' and 29' augmented by forces stored in elastics 35'. One interesting characteristic of my tension toggles is that they operate with practically no frictional losses although the applied force is normal to the resultant forces.

The elevator for segment 16 is quite simple including a transverse slat 60, hinges 61, a leg 62 and an adjustable extension 63 attached thereto. The leg is spring operated by elastic 64 and positioned by opposing non-elastic stop straps 65. Leg 62 springs automatically into a supporting position as soon as the outer end 70 of segment 16 is raised by pulling on cord 66 and the legs are collapsed by pulling on cord 67 which passes through guide 69 to pull directly on extension 63.

Notice that transverse slat 60 is positioned substantially midway of segment 16 so that the lower edge of extension 63 is likewise substantially centrally located and acts as a fulcrum so that after end 70 has been raised and leg 62 has been spring-actuated into a supporting position, then a light pressure on end 70 will raise hinge 16X and allow leg 23 to spring into a supporting position which is a very easy mode of operation.

Portability is an important characteristic of a bed board that has long been neglected. A user becomes so attached to a board that to sleep in comfort he must take it with him. My board 10 is so hinged that it may be wrap-folded substantially in thirds with next to the longest segment 16 between two shortest segments 15 and 11, and the longest segment 15.

The operation of my bed board should be obvious from the foregoing description. With segment 11 tied securely to the mattress support 13, the head segment 14 may be raised either by lifting on straps 21 or, while sitting up in bed, by pulling on cord 20.

To lower segment 14, pull on cord 45 which operates the tension toggle 40 which moves hinge 28 to a non-dead center position so that any weight on segment 14 will cause the support leg 22 to collapse flat against the under side of the bed board.

Referring to FIG. 8, imagine this figure turned 180° so that point 33 is resting on springs 13 and segment 14 is supporting at least the weight of a mattress, then if tension toggle strap 43 is pulled hinge 28 will be flexed and moved bodily counter clockwise and elastic 35 will be stretched, but point 33 will not move counter clockwise because it is pressed, by its load, into spring 13.

When point 33, hinge 28 and hinge 26 cease to be in either a straight line or dead center position, then support 22 will collapse flat under its load.

The drawings of necessity do not show fully the thinness of my board which may be made entirely of 1/4" plywood.

An alternate construction is shown in FIG. 1, comprising of a half round projection 80 positioned on the under side of 13 near hinge 14X and 81 positioned on the under side of 15 near hinge 15X. FIG. 2 also shows these locations isometrically. FIG. 2 shows the function of 80 and FIG. 3 shows the function of 81.

Included in this alternate construction is the use of a board (not shown) under segment 11, wide enough to be under 80 and 81 so they will not sink into springs 13. It is also within the scope of my invention to mount said half rounds or other suitable radius arms or radius rock-

ing means on such a board in lieu of mounting them on 13 or 15.

Half rounds 80 and 81 tend to lower section 11 when 13 or 15 are angularly elevated so that if the user will sit or place the weight of his buttocks on section 11, forces will result which tend to tilt 11 or 15.

The similarity of parts in the three elevating segments makes it redundant to repeat the operational explanation for the other elevators in view of the descriptions already given. Since structural variations may be obvious and I have given only two embodiments of several possible embodiments, my invention should be limited only by a broad interpretation of my claims.

I claim:

1. A board with a supporting leg for angularly raising a mattress comprising, when raised, a board to go under a conventional mattress, a normally upright leg supporting said board at an angle, upper hinge means joining the top of the leg to said board, a bottom edge at the foot of said leg on which it rests, intermediate hinge means providing a knee action for said leg, said upper and said intermediate hinge means having axes parallel with each other and with said bottom edge, and opposed elastic and non-elastic means arranged to hold said upper and said intermediate hinge axes and said bottom edge in a near on center alignment while maintaining said leg in said normally upright position and also arranged to permit the lowering of said board and the collapse of said leg incident to a knee like flexure of said intermediate hinge means when the axis of said intermediate hinge means is moved while under load out of said near on center alignment.

2. A board with a supporting leg for angularly raising a mattress comprising, when raised, a board to go under a conventional mattress, a normally upright leg supporting said board at an inclined angle, upper hinge means joining the top of the leg to said board, a bottom edge at the foot of said leg on which it rests, an intermediate hinge means providing a knee like action for said leg, said upper and said intermediate hinge means having axes parallel with each other and with said bottom edges, and opposed elastic and non-elastic means tending to hold said upper and said intermediate hinge axes and said bottom edge in a locking beyond center alignment while maintaining said leg in said normally upright position, said elastic and non-elastic means also permitting the lowering of said board and the collapse of said leg incident to a knee like flexure of said intermediate hinge means when the axis of said intermediate hinge means is moved back over center and out of alignment with said upper hinge means and said bottom edge.

3. An elevatable, mattress supporting bed board with a supporting leg having a knee joint normally locked in an over center position by the weight thereon and by means limiting its further movement in one direction, and means to apply a mechanical advantage to unlock said knee joint by pulling it back, over and past center comprising a flexible tension member which when under tension is substantially straight and taut, a first end of which attached to said leg near said knee joint, a second end of which fixed to said board at a substantial distance from said knee joint, and a second flexible tension member capable of applying a direct force substantially midway of said first member and substantially at right angles thereto thereby providing a mechanical advantage drawing the two ends of said first member together for a relatively short distance with a greater force than the force directly applied through a greater distance by said second tension member.

4. An elevatable, mattress supporting bed board having means normally held in locking position by an elastic element said means holding said board at a selected angle of incline, and means to apply a mechanical advantage against said elastic element comprising a substantially taut flexible tension member, one end thereof attached to said first means to move it from its normally locking position, a second end of said member anchored to said bed board a

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substantial distance from said first end, and means to apply a manual force laterally on said flexible tension member sufficiently away from said ends to produce a mechanical advantage thereby shortening the operative distance between said ends for a relatively short distance with a greater force than the manual force applied laterally thereto.

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