

May 24, 1966

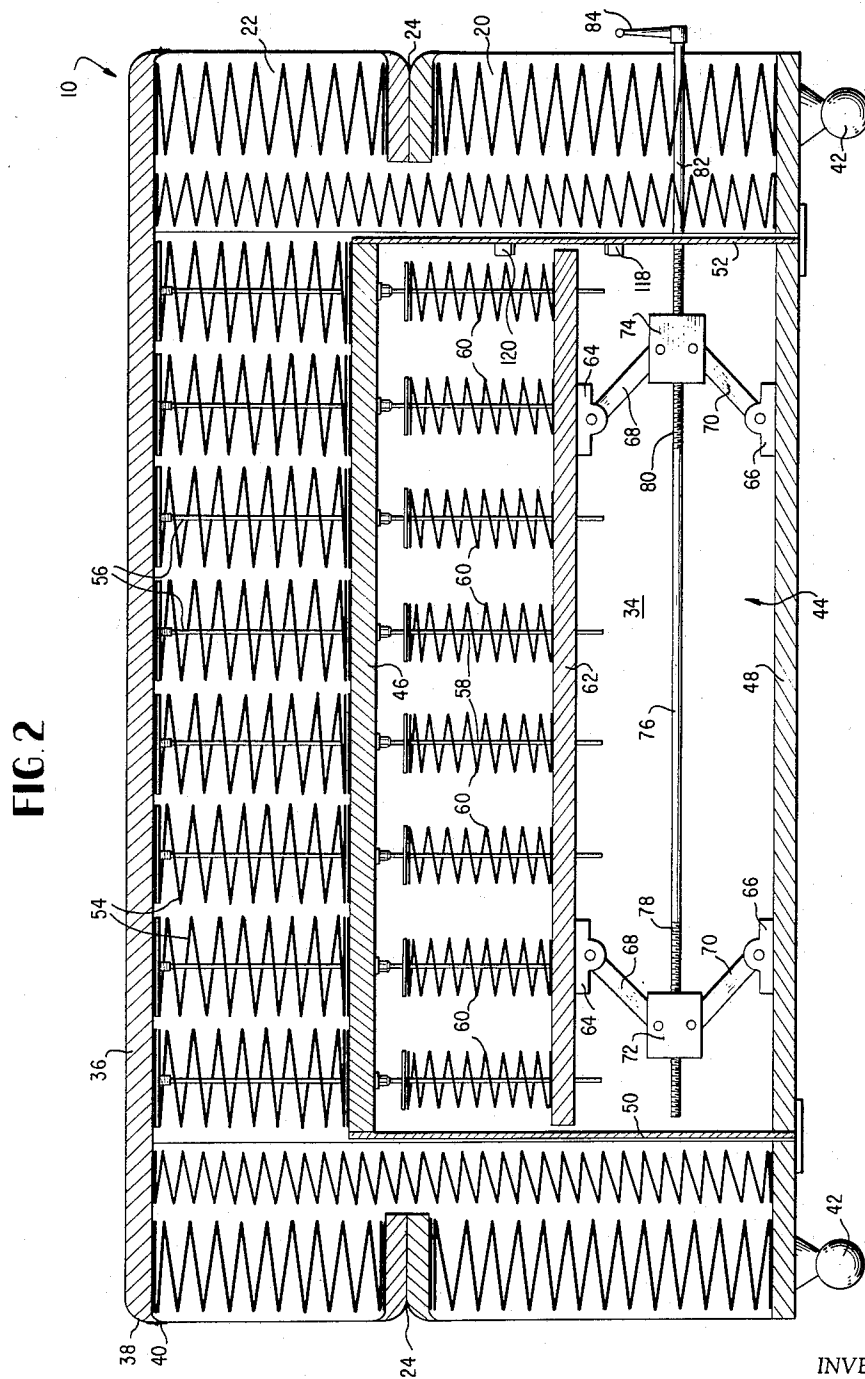
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3,252,170

VARIABLE FIRMNESS MATTRESS

Filed Aug. 8, 1963

5 Sheets-Sheet 2



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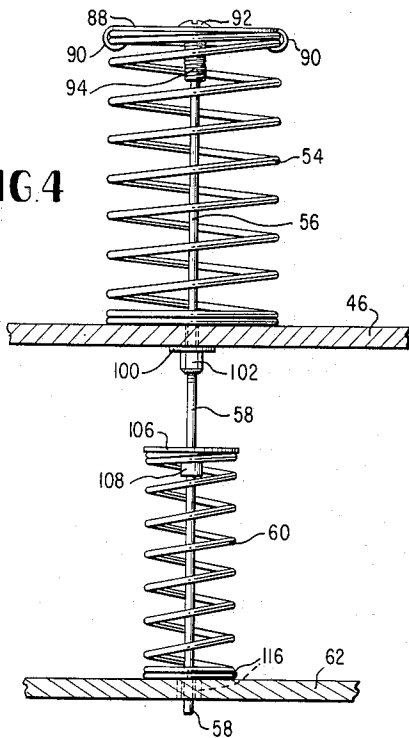
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FIG 4



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FIG 5

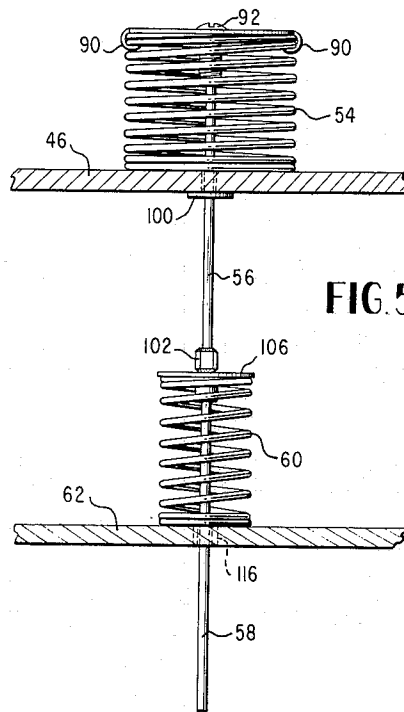


FIG 6

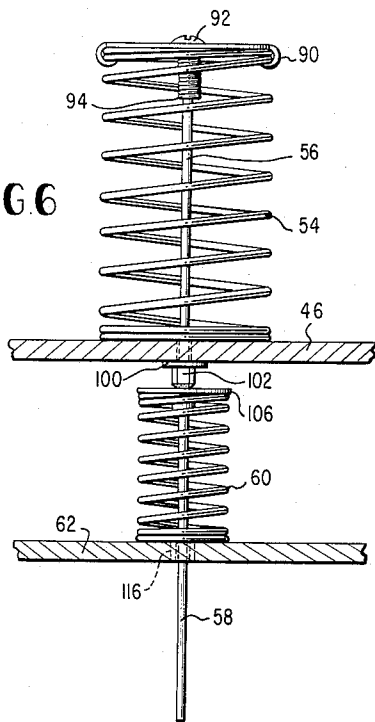
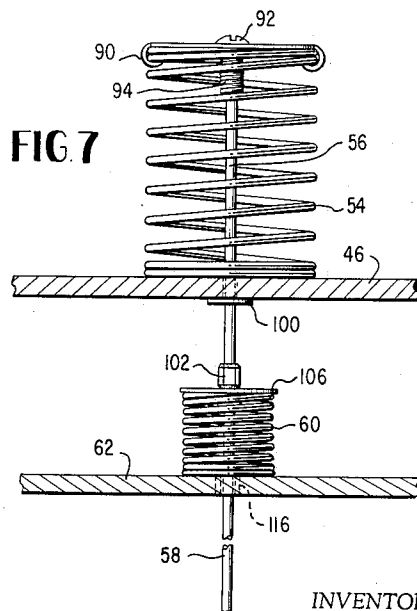


FIG 7



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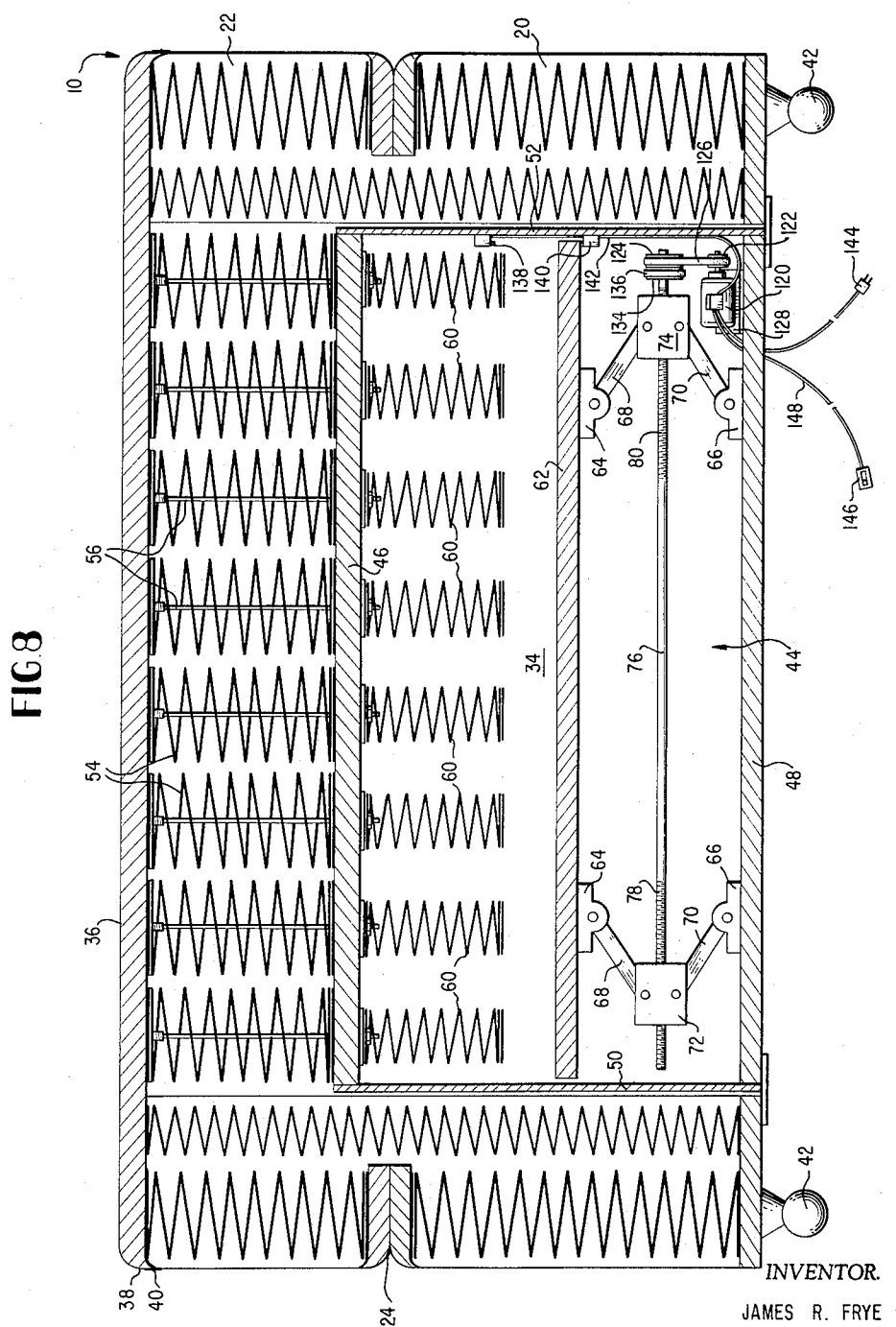
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5 Sheets-Sheet 5

FIG 9

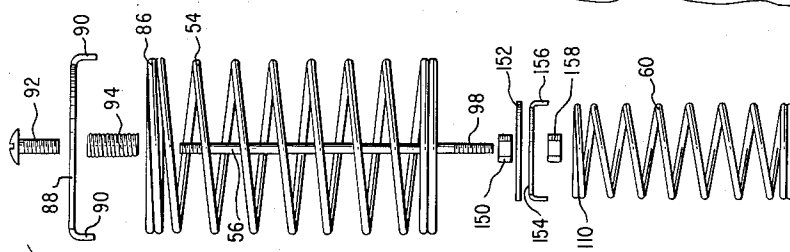
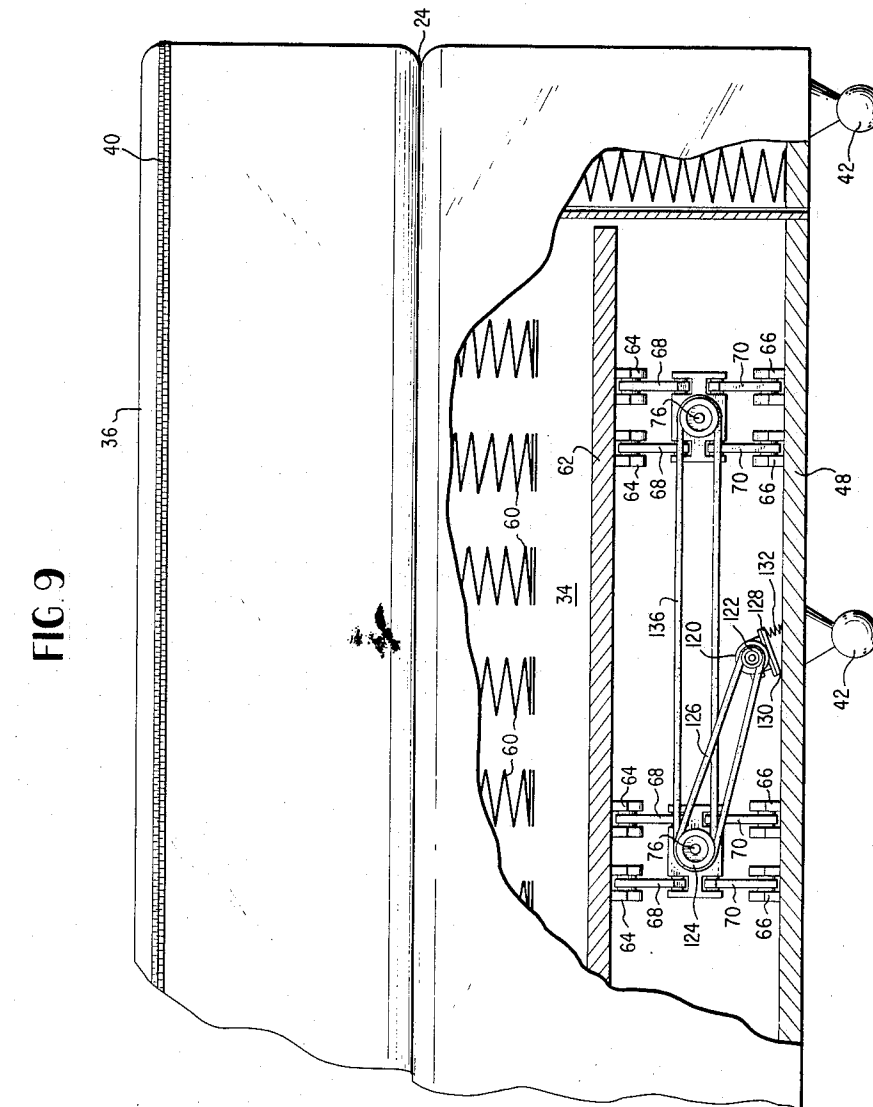


FIG 10

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VARIABLE FIRMNESS MATTRESS

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5 Claims. (Cl. 5-248)

This invention relates to spring cushion devices and more particularly to mattresses wherein the firmness of the mattress may be varied from relatively soft to relatively hard at the desire of the user.

As is well known, individual taste in mattress firmness varies widely between different individuals with some preferring a relatively soft mattress while others prefer to sleep on a mattress that is more firm. Not only may the relative firmness of the mattress seriously affect a person's ability to sleep, but very often the choice is the result of actual physical discomfort. For many people, a mattress that is too soft may result in serious backaches or other discomforts while a similar result may be true for other persons sleeping on a mattress that is too hard.

This problem is particularly aggravated for the operator of a commercial establishment such as a hotel or motel where different persons sleep on a mattress almost every night. It is a quite common requirement of patrons of a commercial establishment that they have either a firm, medium or soft mattress as the case may be. Many times patrons will test of mattresses and move to a different unit in the motel or hotel until they find one that suits them.

The present invention avoids the above-mentioned difficulties by providing a mattress construction that may be readily and simply varied as to firmness in accordance with the desire of the user. The mattress of the present invention is readily adapted to conventional size bedding such as sheets and blankets and variation of the mattress firmness produces no distortion or change in the overall size of the unit. The mattress is of relatively simple, inexpensive construction and incorporates a plurality of readily removable components so that the mattress may be easily and simply disassembled for repair or for replacement of parts. In one embodiment of the invention, the unit is provided with a motor and switch control so that the firmness may be adjusted by a simple hand manipulation of a dial while the person is lying on the mattress.

It is therefore one object of the present invention to provide a novel cushion device having adjustable firmness.

Another object of the present invention is to provide a metal spring cushion device wherein the firmness may be varied at the desire of the user.

Another object of the present invention is to provide a variable firmness mattress.

Another object of the present invention is to provide a readily assembled and disassembled mattress substantially reducing the complications of part replacement and repair.

Another object of the present invention is to provide a mattress wherein the variation in firmness produces no distortion or change in the physical size of the unit.

These and further objects and advantages of the invention will be more apparent upon reference to the following specification, claims and appended drawings wherein:

FIGURE 1 is a perspective exploded view of the outer portion of the novel mattress of the present invention;

FIGURE 2 is a vertical cross section through the mattress of FIGURE 1 showing both the outer portion and the central variable firmness insert.

FIGURE 3 is an exploded detail view of the spring construction of the mattress of FIGURES 1 and 2.

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FIGURE 4 shows the mattress set for relatively soft firmness and the springs undistorted by a person's weight.

FIGURE 5 is a view similar to FIGURE 4 showing the compression of the springs under body weight.

FIGURE 6 is a view similar to that of FIGURE 4 with the mattress set for relatively hard firmness.

FIGURE 7 is a view similar to that of FIGURE 6 showing the springs again compressed by body weight.

FIGURE 8 is a vertical cross section corresponding to that of FIGURE 2 showing a modified embodiment of the mattress of the present invention.

FIGURE 9 is a partial cross section taken at right angles to that of FIGURE 8 showing the drive mechanism for varying the mattress firmness; and

FIGURE 10 is an exploded view showing details of the spring construction of the mattress embodiment of FIGURE 8.

Referring to the drawings, the outer portion of the mattress generally indicated at 10 in FIGURE 1 comprises a pair of end bolsters 16 and 18 and side bolsters 14 and 12. Each of the bolsters may comprise a lower section such as 20 corresponding to the conventional box spring and an upper section 22 corresponding to the conventional mattress spring. The bolsters contain the conventional pocketed springs and although the upper and lower sections are permanently joined they are divided around their outer edge as best seen at 24 in FIGURE 2 to provide a space for tucking in sheets, blankets and the like.

The lower outer edge portions of the bolsters are provided with a tacking skirt 26 which is attached to and covers the outer edge of a wooden bottom frame 28. The frame is provided with a plurality of vertically extending support posts adapted to be received in corresponding pockets 32 formed in the bolsters. The cooperating support posts and pockets act to accurately position the bolsters and secure them together while at the same time permitting ready disassembly of the unit for access to the central insert filling the space indicated generally at 34 in FIGURE 1.

Positioned over the bolsters is a combination mattress top padding and cover 36 provided with one side of a zipper along each of its lower outer edges as indicated at 38. The bolsters are provided with similar zipper halves 40 by means of which the mattress padding and cover 36 may be attached to the end and side bolsters. As indicated the cover 36 is zippered along all four edges to the top of the bolsters. Suitable casters such as 42 may be attached to the under side of the bottom frame 28.

As best seen in FIGURE 2 the central area 34 is filled by a variable firmness insert generally indicated at 44 including a rectangular wooden frame having a top plate 46 and a bottom plate 48 rigidly adjoined by four side plates two of which are indicated at 50 and 52. Suitably secured at their lower ends to the upper side of top plate 46 are a plurality of primary coil springs 54, the tops of which lightly engage the underside of top cover 36. Attached to the upper ends of primary springs 54 are central rods 56 which pass downwardly through suitable apertures in plate 46 and are joined to lower spring rods 58. A plurality of secondary coil springs 60 are suitably secured at their lower ends to an elevator plate 62 and surround the lower rods 58. These latter rods slidably pass through suitable apertures in the elevator plate 62.

Connected to the underside of elevator plate 62 are a plurality of brackets 64 and similar brackets 66 are connected to bottom plate 48 of the insert. The upper ends of levers or actuating arms 68 are pivoted to the brackets 64 and the lower ends of similar levers or actuating arms 70 are similarly pivoted to the lower brackets 66. The adjacent ends of the actuator arms 68 and 70 are pivoted

to respective threaded bearing blocks 72 and 74 engaging with a rotatable jack screw 76. Screw 76 is threaded in opposite directions at 78 and 80 so that rotation of the screw 76 causes the bearing blocks to move simultaneously inwardly or outwardly depending upon the direction of rotation. As illustrated in FIGURE 2 the screw 76 may be provided with a shaft extension 82 having its outer end engageable by a suitable crank 84 for manually rotating the screw 76.

FIGURE 3 is an exploded view showing the details of the spring construction. Primary spring 54 has its upper end 86 connected to a circular metal plate or disc 88 provided with bent over tabs 90 adapted to engage and encircle the upper end of the spring. Disc 88 is attached to the upper rod 56 by means of a screw 92 and a tension spring connector 94 which receives the screw and the threaded end 96 of the upper rod 56.

Received over the lower threaded end 98 of upper rod 56 is a silencing washer 100 and a double faced elastic lock nut connector 102.

The threaded lock nut connector 102 also receives the upper threaded end 104 of lower rod 58. Upon downward movement, the lower face of the lock nut connector 102 is adapted to engage a metal washer 106 and a nylon bushing 108 slidably received over the lower rod 58. The upper end 110 of secondary spring 60 firmly engages in an outer annular groove 112 formed in bushing 108 and in this manner is secured to the bushing. If desired, the lower end 114 of the secondary spring may be received over a similar nylon bushing 116 slidably over the lower end of rod 58.

FIGURE 4 shows the spring units completely assembled and the springs in an unstressed position as normally assumed in the mattress. In FIGURE 4 the elevator plate of FIGURE 2 is illustrated at its downwardmost position determined by a limit stop such as 118 shown in FIGURE 2 connected to the side plate 52. A similar upper limit stop 120 is also provided to limit the upward movement of the elevator plate 62.

FIGURE 5 is a view similar to that of FIGURE 4 showing the spring units compressed as is the case when a person lies on the mattress and the body weight acts against the primary spring 54 and secondary spring 60. By comparing FIGURES 4 and 5 it is apparent that when weight is first applied with the elevator 62 in its lowermost or softest position the weight force is first taken up by primary spring 54 until this spring compresses to the point where connector 102 engages the upper end of secondary spring 60. Further compression of primary spring 54 causes the rods to slide downwardly farther through the apertures in top plate 46 and elevator plate 62 until some of the downward force is also resisted by secondary spring 60 and this spring also begins to compress. In this way the initial body weight is resisted only by primary spring 54 thus imparting a softer feel or resiliency to the mattress.

FIGURES 6 and 7 show the action of the springs when the elevator plate 62 is raised to its uppermost or most firm position. In FIGURE 6 no downward force is applied to the springs but the elevator plate 62 is raised so that the upper end of secondary spring 60 engages the lower driving face of connector 102 and the secondary spring is slightly prestressed. In FIGURE 7 a force is applied and both springs are compressed. It can be seen from these figures that with the elevator plate 62 raised even the initial downward force is resisted both by the primary spring 54 and the secondary spring 60 thus imparting a much firmer feel or greater resisting force to compression of the mattress.

FIGURES 8 and 9 show a modified mattress constructed in accordance with the present invention with like parts bearing like reference numerals. The outer portion of the mattress is identical to the embodiment of FIGURES 1 and 2 and again comprises the side and end bolsters secured to the combination pad and cover 36

preferably by a zipper as in the previous embodiment. The insert 44 again comprises a wood frame including top plate 46, bottom plate 48, side plates 50 and 52 and the elevator plate 62. Also provided are the primary springs 54 and secondary springs 60 with the elevator plate 62 raised and lowered by the jack screw 76.

However, in the embodiment of FIGURES 8 and 9 jack screw 76 is driven by a fractional horsepower reversible electric motor 120 connected to the shaft 76 by a pair of pulleys 122 and 124 and a V-belt 126. Motor 120 is mounted on a plate 128 pivotally connected by a suitable hinge arrangement at 130 (see FIGURE 9) to the lower plate 48. Connected to the opposite edge of the motor mounting plate 128 is a tension spring 132 acting to maintain tension on the pulley belt 126.

As illustrated in FIGURE 9 more than one shaft 76 may be provided and these may be coupled together to be driven in unison by suitable pulleys such as pulley 134 shown in FIGURE 8 and an additional belt 136 as illustrated in FIGURE 9. In the embodiment of FIGURES 8 and 9 upward and downward movement of elevator plate 62 is limited by stop switches 138 and 140 connected by way of leads 142 to motor 120. Power may be supplied to the motor from a conventional 110-volt outlet over lead 144. The direction and amount of rotation of motor 120 may be governed by a manual control switch 146 connected by a flexible lead 148 to the motor. Control switch 146 is preferably accessible to a person lying on top of the mattress so that the firmness may be adjusted by a simple hand manipulation of a dial on the control switch in accordance with the desired comfort as a person reclines on the unit.

As can be seen in the embodiment of FIGURES 8 and 9 lower rods 58 are eliminated and the upper ends of the secondary springs 60 are rigidly connected to the lower ends of upper rods 56. In the downwardmost position as illustrated in FIGURE 8, elevator plate 62 is spaced below the lower ends of the secondary springs 60 so that these springs do not come into play until the rods 56 are pushed downwardly a sufficient distance so that the lower ends of the springs engage the top surface of the elevator plate. However, as noted by the position of stop switch 138 when the elevator plate 62 is raised to its uppermost or most firm position the secondary springs 60 are slightly prestressed and come into play immediately upon compression of the primary springs 54 so as to impart an increased hardness to the feel or resiliency of the mattress.

FIGURE 10 is an exploded view showing the details of the spring construction for the embodiment of FIGURES 8 and 9. Like parts again bear like reference numerals. In this embodiment, the lower rod is omitted and the lower threaded end 98 of the upper rod 56 receives a stop nut 150, a metal washer 152, and a metal disc or plate 154 similar to disc 88 in having tabs 156 adapted to bend over and engage the upper end 110 of secondary spring 60 to hold the secondary spring above the elevator plate 62 when in the position illustrated in FIGURE 8. Also threaded over the lower end 98 of the rod is an elastic lock nut 158 which keeps the entire assembly of nut 150, washer 152 and disc 154 properly positioned and secured to the end of the rod. It is believed that the action of the primary and secondary springs upon depression of the mattress due to body weight and the modifications of the mattress resiliency in accordance with the vertical position of elevator plate 62 will be readily apparent and is essentially similar to the action previously described in conjunction with the embodiment of FIGURES 1 and 2.

It is apparent from the above that the present invention provides a novel adjustable mattress wherein the relative firmness of the mattress may be adjusted or varied in accordance with whether the sleeper prefers a hard or soft mattress. The invention is particularly suited for use in commercial establishments including

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hotels and motels where the user of the mattress is constantly changing and each patron may have a desire for a different type of resiliency in a mattress. An important feature is that the standard mattress and box spring combination is eliminated as such and the entire mattress or sleeping unit is comprised of a fixed or stationary outer unit and one or more inner adjustable units as desired. The outer unit is made in such a manner that it is easily assembled or disassembled. Similarly, access may be readily provided to the drive mechanism by simply removing one of the side plates 50 or 52 of the inner frame. The unit is designed to have a minimum of moving parts so as to be simple and durable. The removable mattress top cover and padding 36 makes it possible to readily substitute a new cover without reconditioning the entire mattress when the cover may become soiled due to bed-wetting, vomiting, burn holes, spilled liquids or the like as so often happens.

An important feature of the invention resides in the fact that prestressing of the secondary springs produces no uncomfortable distortion of the mattress, particularly at the sleeping surface of cover 36. Likewise the overall shape of the unit never changes since the prestressed secondary springs (when set for maximum hardness) act against the rigid and immovable top plate 46. This makes possible the use of conventional size bedding irrespective of the hardness setting of the mattress.

Either of the embodiments described may be driven by an electrical motor or a hand crank or both at the option of the user. Similarly, the usual bed spring slats may be employed under the entire unit to compensate for variances in width of side bed frames or rails and to provide additional support for the unit. While described in conjunction with a single variable insert, it is apparent that two or more inserts may be installed in a single bed to achieve various degrees of support of the anatomy at the shoulders, middle and lower back as desired. Adjustment is quickly and easily accomplished and may be operated by simply turning a dial and such variation in firmness results in no distortion on the mattress or any change in its size or configuration. While described in conjunction with a mattress, the present invention is also useful in other spring cushion devices such as chairs, sofas, car seats and the like.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A variable firmness mattress comprising a bottom frame and edge bolsters, a cover pad, an upper layer of vertically extending coil springs, a dividing wall beneath said upper layer of springs, a lower layer of vertically extending coil springs beneath said dividing wall and in vertical alignment with said upper springs, central rod

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means connecting the upper end of each of said upper springs to the upper end of a corresponding lower spring, said rod means being slidably received through said dividing wall, a vertically movable elevator platform positioned beneath said lower springs, a jackscrow beneath said elevator platform, a pair of bearing blocks threaded over said jackscrow, pivoted links joining said bearing blocks to said elevator platform and said bottom frame, and means for selectively rotating said jackscrow in opposite directions.

2. A mattress according to claim 1 wherein said rotating means comprises a reversible electric motor, and control means for said motor accessible from a prone position on top of said mattress.

3. A variable firmness mattress comprising a bottom frame, separate side and end bolsters having springs, means on said bottom frame for positioning said bolsters in a rectangle to define a central insert area, a cover pad for said mattress, zipper means for joining said cover pad to said bolsters, a removable insert including an upper layer of vertically extending coil springs terminating adjacent the underside of said cover pad, a dividing wall beneath said upper layer of springs, a lower layer of vertically extending coil springs beneath said dividing wall and in vertical alignment with said upper springs, central rod means connected to the upper end of each of said upper springs and having a lower portion engaging the upper end of a corresponding lower spring upon downward movement of said rod means, said rod means being slidably received through said dividing wall, a vertically adjustable elevator platform engaging the lower ends of said lower springs upon upward movement of said platform, the lower ends of said upper springs resting on said dividing wall, a jackscrow for raising and lowering said elevator platform, and means for rotating said jackscrow.

4. A mattress according to claim 3 wherein said bolsters are divided about the periphery of said mattress to provide a tucking space for bedding.

5. A mattress according to claim 4 wherein said jackscrow is driven by a reversible electrical motor, and control means for said motor accessible to a person lying on said mattress.

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