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Rawls-Meehan et al.

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(54) **ADJUSTABLE BED APPARATUS AND METHODS INCORPORATING LUMBAR AND NECK SUPPORTS**

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A61G 7/005	(2006.01)
A61G 7/002	(2006.01)
A47C 7/46	(2006.01)

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See application file for complete search history.

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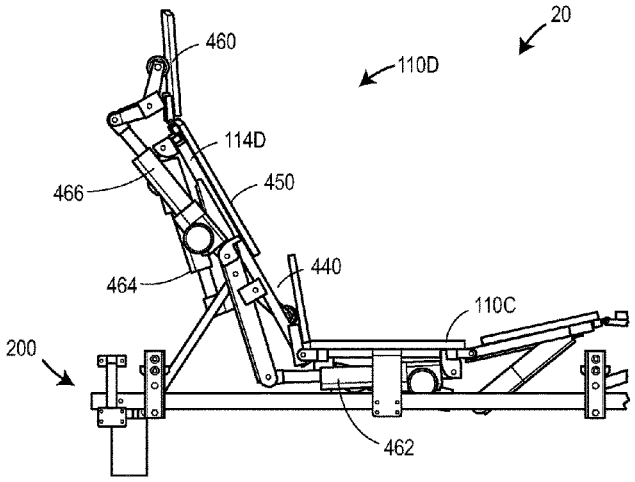
(57) **ABSTRACT**

The disclosure generally relates to an adjustable bed apparatus, in particular an adjustable bed foundation. The adjustable foundation includes independently adjustable lumbar and/or neck support structures on an adjustable back/head section of the adjustable bed foundation. In some embodiments, the lumbar and neck support structures include inflatable air bladder structures. In other embodiments, the lumbar and neck support structures include mechanically actuatable subsections of the adjustable back/head section of the adjustable bed foundation.

8 Claims, 8 Drawing Sheets



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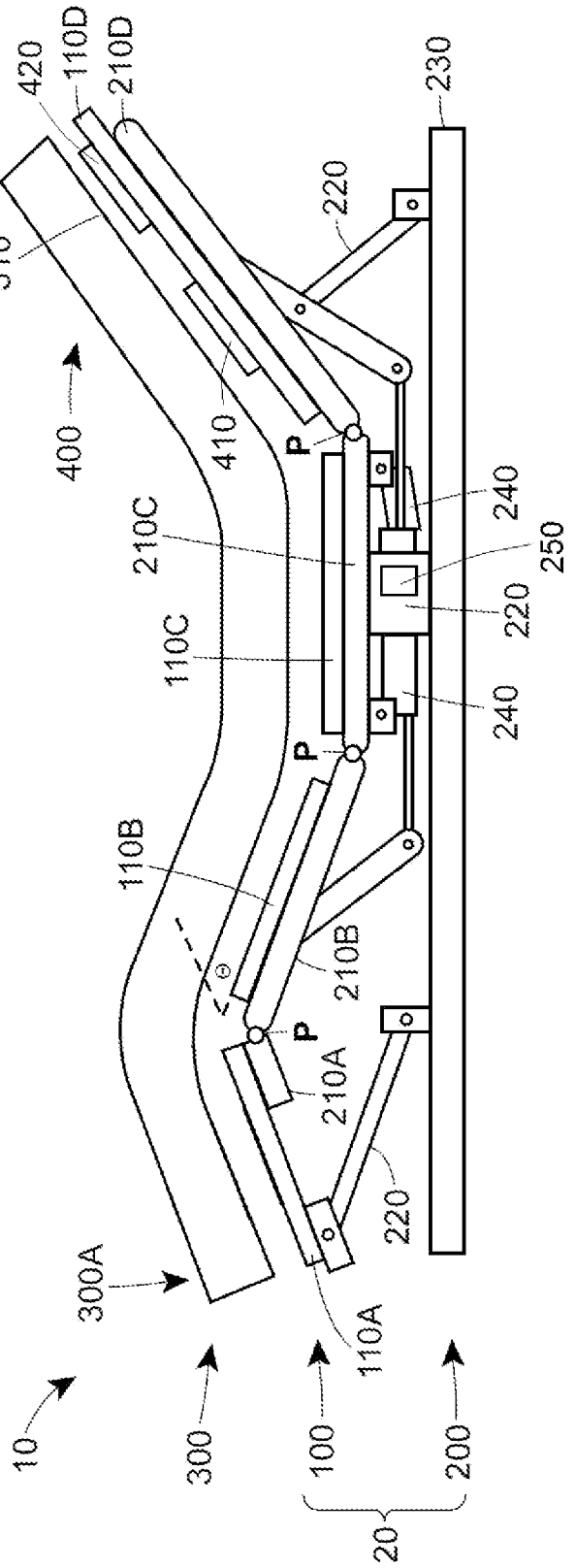
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210D
230
310
220
400
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240
210C
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110B
210B
P
210A
220
300A
110A
10
300
100
200
20

Figure 1

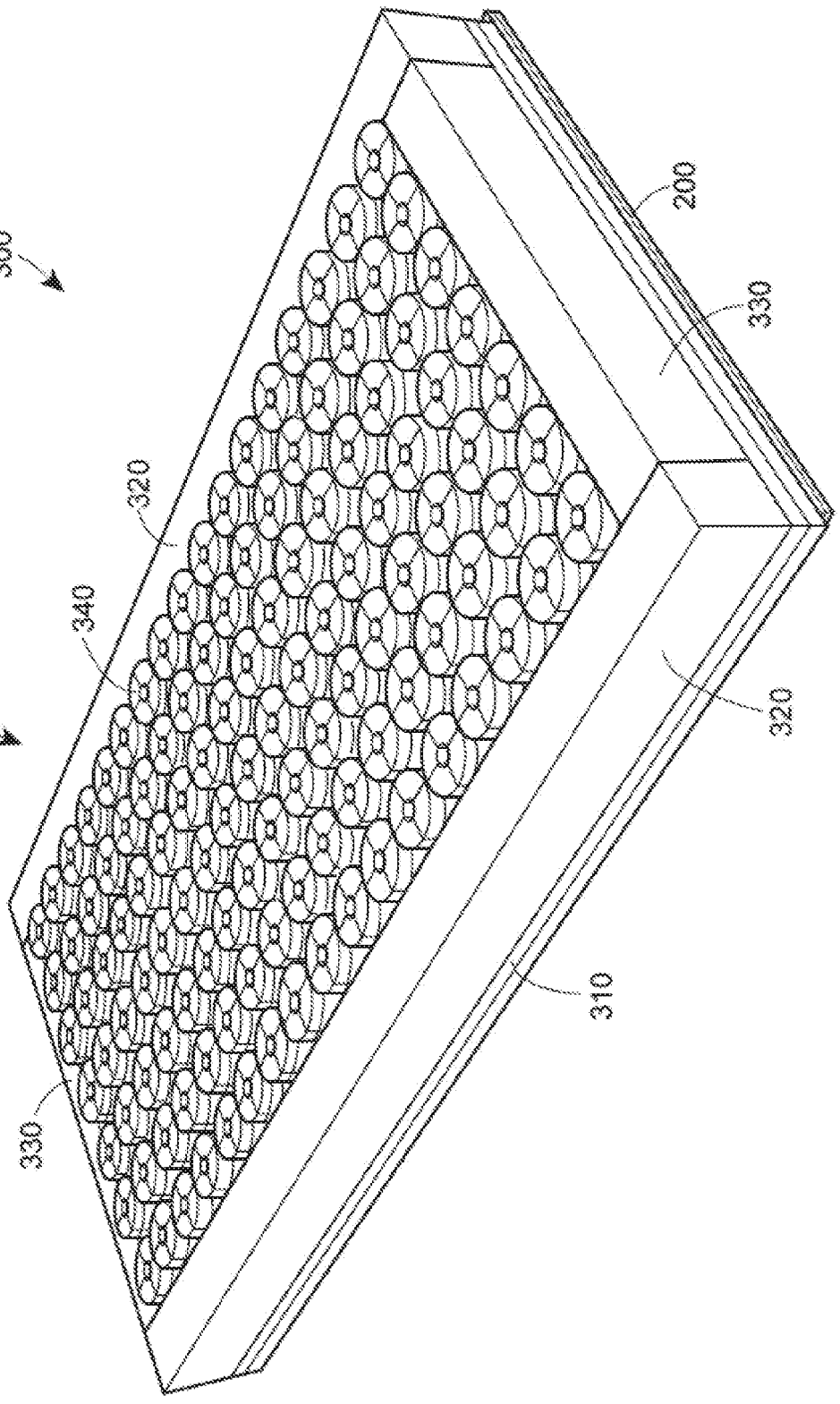

Figure 2

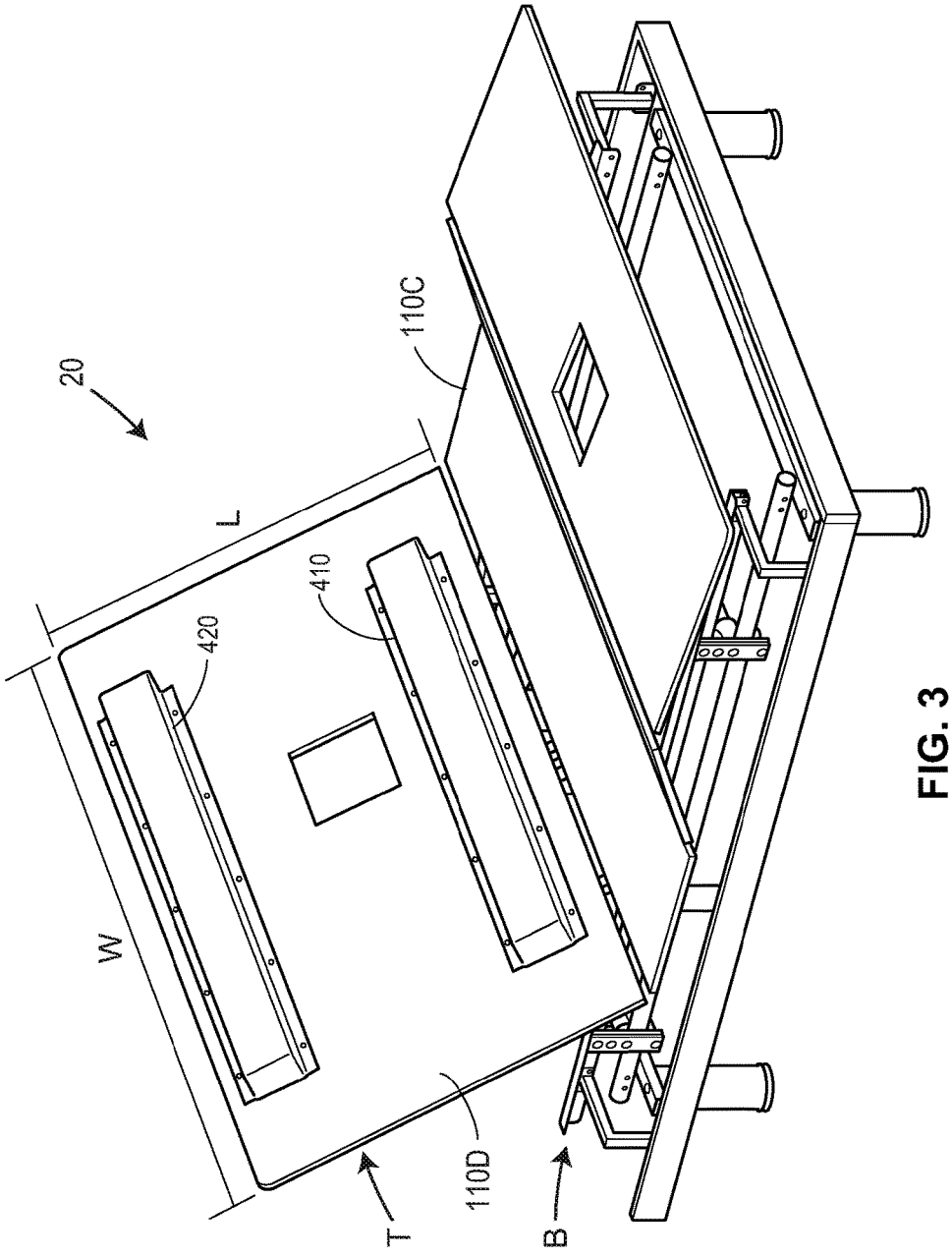

FIG. 3

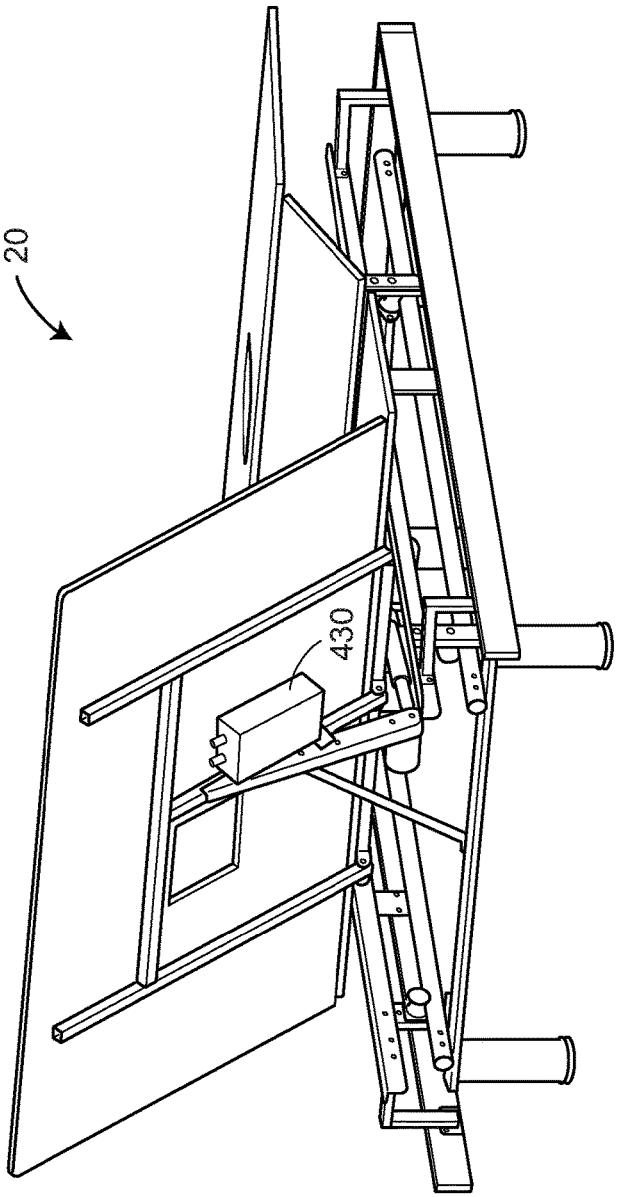

Figure 4

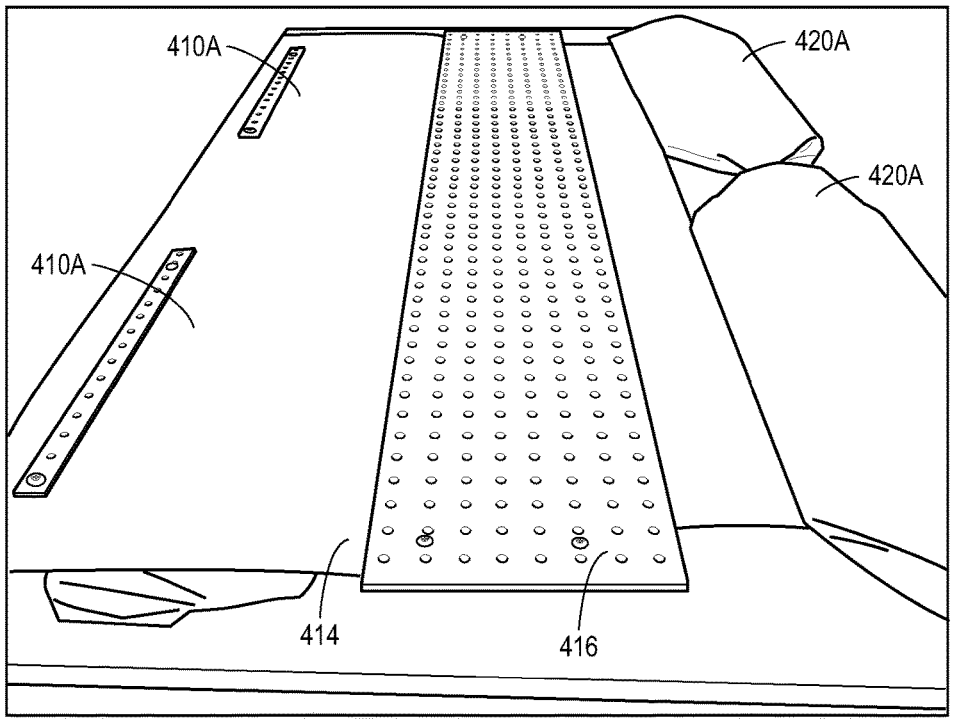

Figure 5

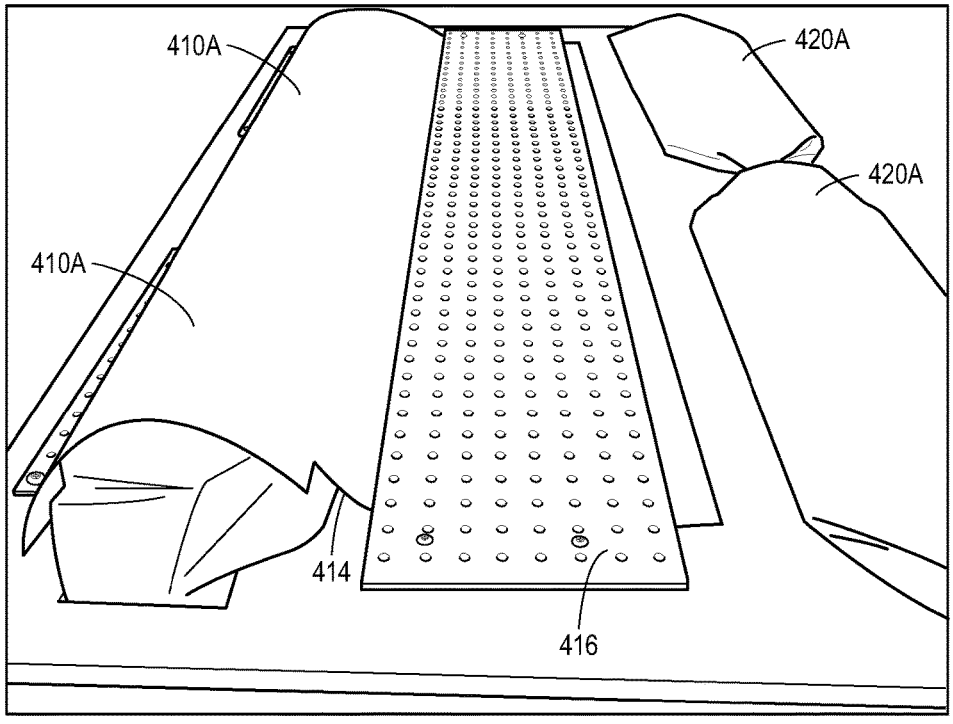

Figure 6

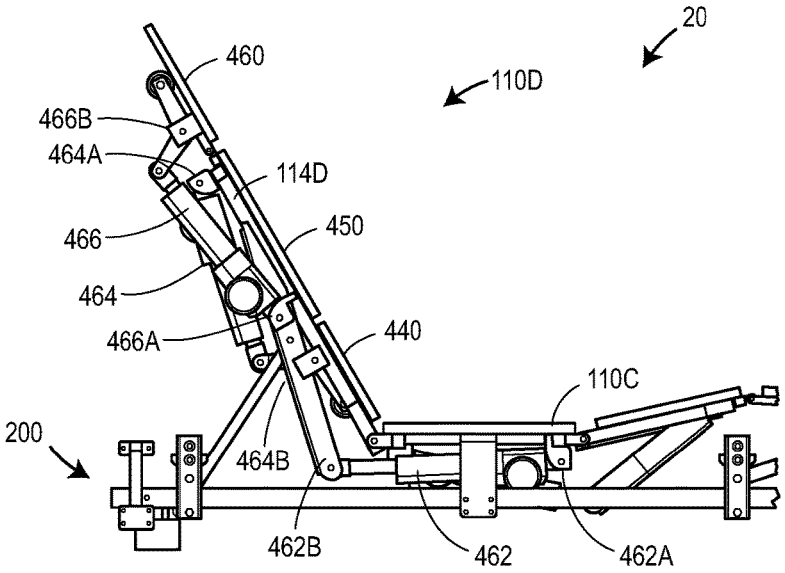

Figure 7

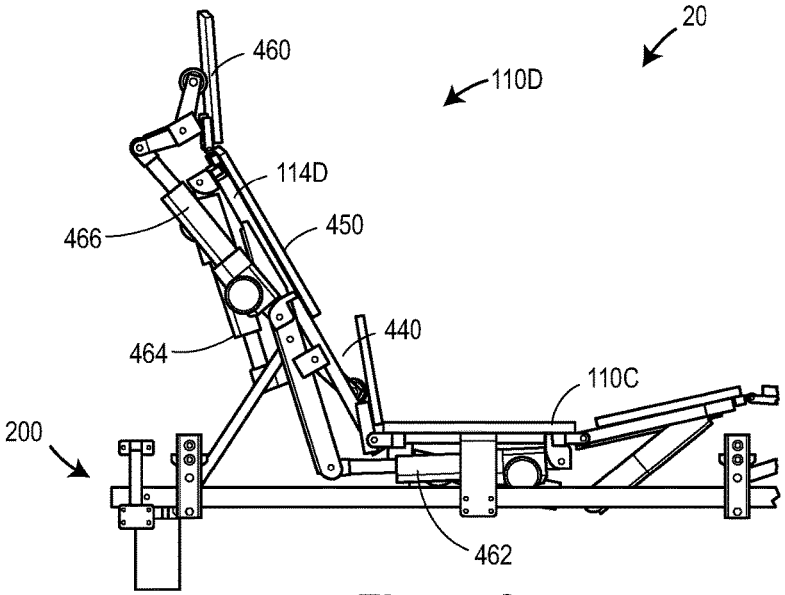

Figure 8

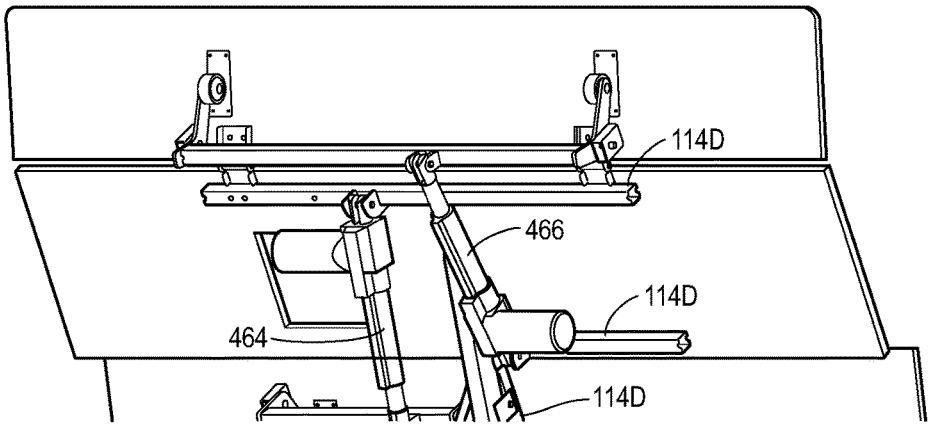

Figure 9

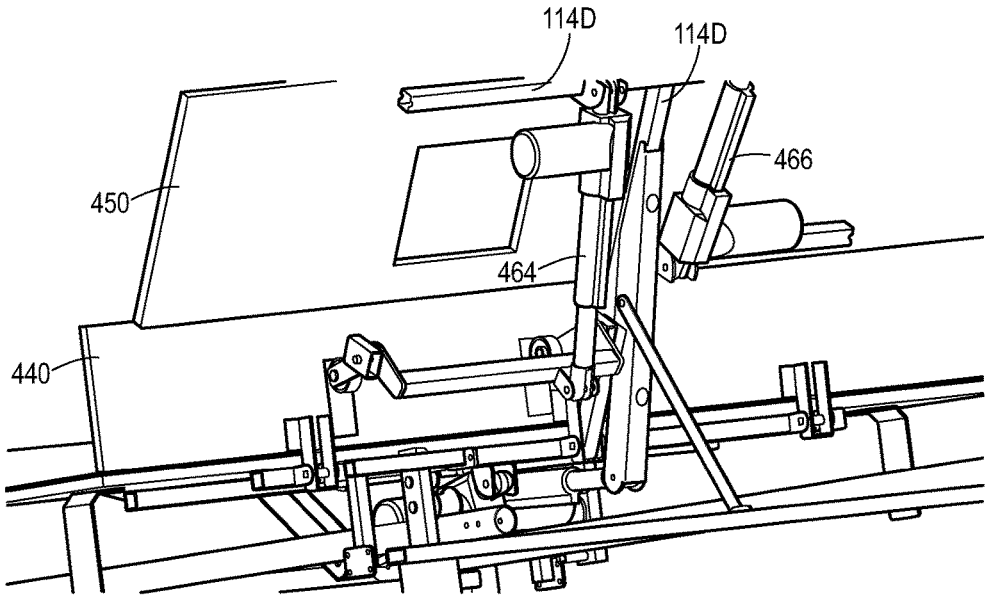

Figure 10

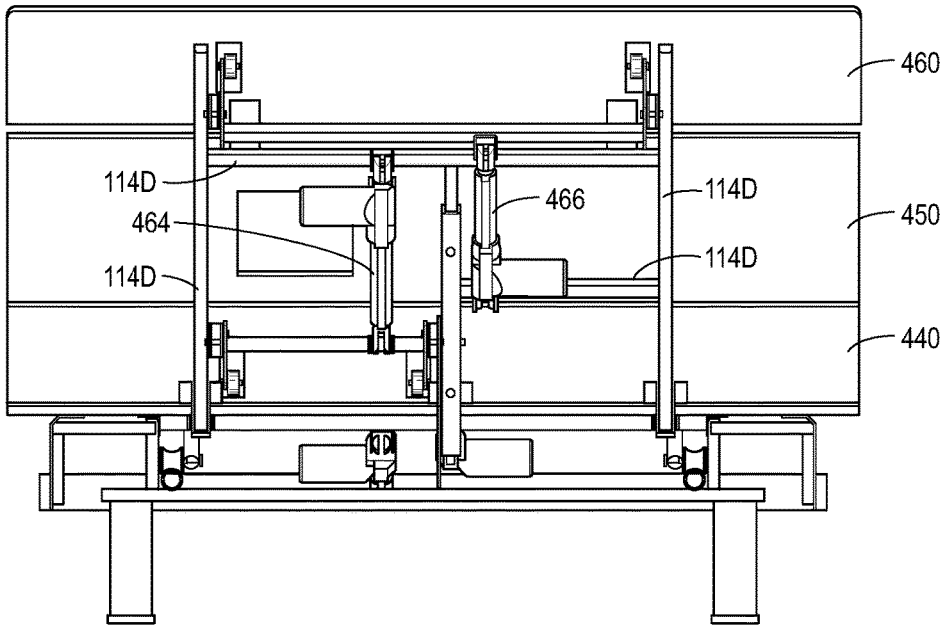

Figure 11

ADJUSTABLE BED APPARATUS AND METHODS INCORPORATING LUMBAR AND NECK SUPPORTS

CROSS REFERENCE TO RELATED APPLICATION

Priority is claimed to U.S. Provisional Application No. 62/130,707 (filed Mar. 10, 2015), which is incorporated herein by reference in its entirety.

STATEMENT OF GOVERNMENT INTEREST

None.

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

The disclosure generally relates to an adjustable bed apparatus, in particular an adjustable bed foundation. The adjustable foundation includes independently adjustable lumbar and/or neck support structures on an adjustable back/head section of the adjustable bed foundation.

SUMMARY

In one aspect, the disclosure relates to an adjustable bed comprising: (a) a mattress support surface comprising (i) a first deck support section corresponding to a back and head portion of the mattress support surface, and (ii) a second deck support section pivotally attached to the first deck support section; (b) an inflatable lumbar support laterally extending across the first deck support section and disposed on an upper surface of the first deck support section; and (c) an inflatable neck support laterally extending across the first deck support section and disposed on an upper surface of the first deck support section. In an alternative aspect, the adjustable bed comprises the inflatable lumbar support and the inflatable neck support is an optional component or omitted from the support system. In another alternative aspect, the adjustable bed comprises the inflatable neck support and the inflatable lumbar support is an optional component or omitted from the support system.

Various embodiments and refinements of the adjustable bed are possible.

In a refinement, the inflatable lumbar support is positioned in a bottom region of the first deck support section.

In another refinement, the inflatable neck support is positioned in a top region of the first deck support section.

In another refinement, the inflatable lumbar support extends at least 60% of the mattress support surface lateral width.

In another refinement, the inflatable neck support extends at least 60% of the mattress support surface lateral width.

In another refinement, the inflatable lumbar support is a single inflatable bladder extending across the first deck support section.

In another refinement, the inflatable lumbar support comprises a plurality of inflatable bladders extending across the first deck support section.

In another refinement, the inflatable neck support is a single inflatable bladder extending across the first deck support section.

In another refinement, the inflatable neck support comprises a plurality of inflatable bladders extending across the first deck support section.

In another refinement, the adjustable bed further comprises a means for supplying pressure to the inflatable lumbar support and the inflatable neck support.

In another refinement, the adjustable bed further comprises a flexible lumbar pressure distribution member mounted to the first deck support section and at least partially covering or enclosing the inflatable lumbar support.

In another refinement, the adjustable bed further comprises a flexible neck pressure distribution member mounted to the first deck support section and at least partially covering or enclosing the inflatable neck support.

In another aspect, the disclosure relates to an adjustable bed comprising: (a) a stationary bed frame; and (b) a mattress support surface supported by the stationary bed frame and comprising (i) a first deck support section corresponding to a back and head portion of the mattress support surface, and (ii) a second deck support section pivotally attached to the first deck support section; the first deck support section comprising: a longitudinally extending support frame pivotally attached to the second deck support section; a back support deck section fixedly mounted to an upper surface of a middle section of the support frame; a first actuator having (A) a first end mounted to one or more of the second deck support section and the stationary bed frame, and (B) a second end mounted to the support frame, wherein the first actuator is adapted to move the support frame between articulated and substantially flat positions relative to the stationary bed frame; a lumbar support deck section pivotally mounted to the second deck support section and positioned above an upper surface of a bottom section of the support frame; a second actuator having (A) a first end mounted to the support frame, and (B) a second end mounted to the lumbar support deck section, wherein the second actuator is adapted to move the lumbar support deck section between articulated and substantially flat positions relative to the support frame; a neck support deck section pivotally mounted to the support frame and positioned above an upper surface of a top section of the support frame; and a third actuator having (A) a first end mounted to the support frame, and (B) a second end mounted to the neck support deck section, wherein the third actuator is adapted to move the neck support deck section between articulated and substantially flat positions relative to the support frame. In an alternative aspect, the neck support deck section and the third actuator are optional components of or omitted from the first deck support section. In another alternative aspect, the neck support deck section and the third actuator are optional components of or omitted from the first deck support section.

In some embodiments, the first end of the first actuator has a fixed pivotal attachment to the one or more of the second deck support section and the stationary bed frame, and the second end of the first actuator has a fixed pivotal attachment to the support frame. In some embodiments, the first end of the second actuator has a fixed pivotal attachment to the support frame, and the second end of the second actuator has a floating pivotal attachment to the lumbar support deck section. In some embodiments, the first end of the third actuator has a fixed pivotal attachment to the support frame, and the second end of the third actuator has a floating pivotal attachment to the neck support deck section.

Various embodiments and refinements of the adjustable bed are possible.

In a refinement, the mattress support surface further comprises (iii) a third deck support section pivotally

attached to the second deck support section, and (iv) optionally a fourth deck support section pivotally attached to the third deck support section.

In another refinement, the bed further comprises a mattress positioned above the mattress support surface. The mattress can be selected from the group consisting of a spring mattress, a coil mattress, a memory foam mattress, and an air mattress.

In another refinement, the adjustable bed comprises first and second mattress support surfaces arrange in a side-by-side configuration, and first and second inflatable lumbar supports and inflatable neck supports positioned on the respective first deck support sections.

Additional features of the disclosure may become apparent to those skilled in the art from a review of the following detailed description, taken in conjunction with the drawings, examples, and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the disclosure, reference should be made to the following detailed description and accompanying drawings wherein:

FIG. **1** is a side view of an adjustable bed according to the disclosure.

FIG. **2** is a perspective view of a mattress for use with the adjustable bed of FIG. **1**.

FIG. **3** is a front perspective view of an adjustable bed according to the disclosure including inflatable air bladder lumbar and neck support structures.

FIG. **4** is a rear perspective view of an adjustable bed according to the disclosure including inflatable air bladder lumbar and neck support structures.

FIG. **5** is a top perspective view of an adjustable bed according to the disclosure including inflatable air bladder lumbar and neck support structures and a pressure distribution member in a relaxed state.

FIG. **6** is a top perspective view of an adjustable bed according to the disclosure including inflatable air bladder lumbar and neck support structures and a pressure distribution member in an extended state.

FIG. **7** is a side view of an adjustable bed according to the disclosure including mechanical lumbar and neck support structures in a flat state.

FIG. **8** is a side view of an adjustable bed according to the disclosure including mechanical lumbar and neck support structures in an articulated state.

FIG. **9** is an upper rear perspective view of an adjustable bed according to the disclosure including mechanical lumbar and neck support structures in an articulated state.

FIG. **10** is a lower rear perspective view of an adjustable bed according to the disclosure including mechanical lumbar and neck support structures in an articulated state.

FIG. **11** is a rear view of an adjustable bed according to the disclosure including mechanical lumbar and neck support structures in a flat state.

While the disclosed apparatus and methods and are susceptible of embodiments in various forms, specific embodiments of the disclosure are illustrated (and will hereafter be described) with the understanding that the disclosure is intended to be illustrative, and is not intended to limit the claims to the specific embodiments described and illustrated herein.

DETAILED DESCRIPTION

The disclosure generally relates to an adjustable bed apparatus, in particular an adjustable bed foundation. The adjustable foundation includes independently adjustable lumbar and/or neck support structures on an adjustable back/head section of the adjustable bed foundation. In some embodiments, the adjustable foundation includes the adjustable lumbar support structures but not the neck support structures. In some embodiments, the adjustable foundation includes the adjustable neck support structures but not the lumbar support structures. In some embodiments, the lumbar and neck support structures include inflatable air bladder structures. In other embodiments, the lumbar and neck support structures include mechanically actuatable subsections of the adjustable back/head section of the adjustable bed foundation.

FIG. **1** is a side view of an adjustable bed **10** according to the disclosure. The illustrated adjustable bed **10** includes an adjustable foundation **20** (e.g., adjustable bed foundation), a mattress **300** sitting atop the adjustable foundation **20**, and a lumbar and neck support system **400** (e.g., lumbar support structure **410** and neck support structure **420** positioned at one or more locations on a back/head portion of the foundation **20** and in direct or indirect contact with the mattress **300**). The support system **400** as illustrated in the figures includes a lumbar support structure **410** and a neck support structure **420**. In some embodiments, the neck support structure **420** is optional and can be omitted (e.g., the system **400** includes only the lumbar support structure **410**). In some embodiments, the lumbar support structure **410** is optional and can be omitted (e.g., the system **400** includes only the neck support structure **420**). The adjustable foundation **20** can include a mattress support (or deck) **100** mounted to an adjustable frame **200**. FIG. **2** is a top perspective illustration of a mattress **300** according to the disclosure.

The mattress support **100** includes a deck support **110** platform, for example including a plurality of deck support sections **110**A-**110**D as illustrated. A deck support platform **110** formed from a plurality of deck support sections **110**A-**110**D, each having a corresponding upper surface **112**A-**112**D (i.e., the surface which supports the mattress **300**) is suitable for the adjustable foundation **20**. In the illustrated embodiment, section **110**A corresponds to the foot portion of the bed, section **110**B corresponds to the leg portion of the bed, section **110**C corresponds to the bottom portion of the bed, and section **110**D corresponds to the head and neck portion of the bed **10** (i.e., where the sections correspond to the body portion of a user laying on the bed **10**/mattress **300** in a normal use orientation). Each section **110**A-**110**D includes longitudinally opposed ends $\mathbf{110A}_1$ and $\mathbf{110A}_2$, $\mathbf{110B}_1$ and $\mathbf{110B}_2$, $\mathbf{110C}_1$ and $\mathbf{110C}_2$, $\mathbf{110D}_1$ and $\mathbf{110D}_2$, respectively, where the longitudinal direction Y is generally defined as being perpendicular to the pivot axis P (described below) and/or along the mattress support **100** length or mattress **300** length. Each deck support section **110**A-**110**D can be pivotally attached to one or more adjacent sections (e.g., directly or indirectly via underlying frame **200** structure as described below), thus allowing each section **110**A-**110**D to rotate independently around the lateral pivot axis P (e.g., an axis generally in the lateral direction X and perpendicular to the longitudinal direction Y). The mattress support **100** generally includes at least two deck support sections, for example including a fourth (foot) support section **110**A, a third (leg) support section **110**B pivotally attached to the fourth section **110**A, a second (bottom) support section **110**C pivotally attached to the third section **110**B, and a first (back/neck/head) support section **110**D pivotally attached to the second section **110**C as shown in FIG. **1**. In other embodiments (not shown), the mattress support **100** can have fewer or more support sections (e.g.,

a third (foot) support section, a second (leg and bottom) support section pivotally attached thereto, and a first (back/head/neck) support section pivotally attached thereto). In some embodiments the support sections **110**A-**110**D can be formed from a rigid support material such as wood or metal. In other embodiments the support sections **110**A-**110**D can be formed from a flexible fabric or padding material (e.g., alone or in combination with a rigid support material, such as a cover or padding for an underlying rigid support material).

The adjustable frame **200** generally provides the mechanical, electrical, and electronic support and articulation components for the adjustable foundation **20** and bed **10**. As illustrated, the adjustable frame **200** includes a frame support **210**, for example including a plurality of frame support sections **210**A-**210**D as illustrated and corresponding to the deck support sections **110**A-**110**D. Each deck support section **110**A-**110**D can be fixedly or removably mounted (e.g., via bolts, screws, or other fastener or adhesive components) to its underlying frame support section **210**A-**210**D such that when one or more frame support sections **210**A-**210**D are articulated, the deck support sections **110**A-**110**D are correspondingly articulated. As illustrated, each frame support section **210**A-**210**D can be pivotally attached at a pivot axis P to one or more adjacent sections (e.g., directly as illustrated and providing an indirect pivotal attachment for corresponding deck support sections), thus allowing each section **210**A-**210**D to rotate independently around the lateral pivot axis P. The adjustable frame **200** generally includes at least two frame support sections, for example including a first (foot) support section **210**A, a second (leg) support section **210**B pivotally attached to the first section **210**A, a third (bottom) support section **210**C pivotally attached to the second section **210**B, and a fourth (head/neck) support section **210**D pivotally attached to the third section **210**C as shown in FIG. **1**. In other embodiments (not shown), the adjustable frame **200** can have fewer or more frame support sections (e.g., a first (foot) support section, a second (leg and bottom) support section pivotally attached thereto, and a third (head/neck) support section pivotally attached thereto).

As illustrated, the adjustable frame **200** further includes a subframe **230**, for example a rigid, non-articulatable frame structure which sits on a floor or within a decorative bed frame common in the furniture industry such as a platform bed (e.g., via various leg elements, not shown) and provides stability for the bed foundation **20** as the adjustable frame **200** is articulated to various different positions. The adjustable frame **200** can further include one or more support members **220** connecting structure between the subframe **230** and the frame support **210** and sections **210**A-**210**D thereof. In some embodiments, one or more of the frame sections **210**A-**210**D can be fixed in position relative to the subframe **230** (e.g., bottom section **210**C as illustrated) and be unable to rotate or articulate relative to the subframe **230**, although other frame sections pivotally attached thereto are able to rotate or articulate. As further illustrated, the adjustable frame **200** can include one or more actuators **240** variously mounted to one or more of the subframe **230**, a support member **220**, and a frame support section **210**A-**210**D. In some embodiments, the subframe **230**, the support members **220**, and the frame support sections **210**A-**210**D can be formed from metal such as steel. The actuators **240** can be any of those commonly known in the art. The actuators **240** and, correspondingly, the configuration or position of the adjustable frame **200**, mattress support **100**, and mattress **300** can be controlled and adjusted by a suitable power supply (not shown), adjustable bed controller **250** (e.g., programmable logic controller or otherwise), and remote control to deliver repositioning commands (not shown).

The mattress **300** is not particularly limited, and it can be a conventional mattress **300** (e.g., a spring or coil mattress, memory foam mattress, air mattress) with a base **310** (e.g., a continuous fabric material) suitable for use on a mattress support structure such as a fixed bed frame or an adjustable bed frame. The mattress suitably has a thickness of at least 20 cm (e.g., at least 20 cm, 30 cm, or 35 cm and/or up to 30 cm, 40 cm, or 50 cm). In the illustrated embodiment, the mattress **300** includes a mattress containment frame **305** including a plurality of foam cells (or foam springs) **340** positioned in the frame **305** to provide the sleeping support surface for the mattress. The mattress containment frame **305** includes a lower/bottom base **310**, sidewalls **320**, and endwalls **330** which generally define the interior frame **305** volume housing the foam cells **340**. The sidewalls **320** and endwalls **330** suitably are formed from a foam material. The base **310** can be a generally continuous fabric material. The mattress **300** is generally positioned above the mattress support **100** surface **112**, for example sitting directly atop the deck support sections **110**A-**110**D. In other embodiments, other structure between the mattress **300** and mattress support **100** surface **112** can be present, for example a padding or cushion material.

FIGS. **3**-**6** illustrate an embodiment in which the lumbar and neck support system **400** includes an inflatable lumbar support **410** and an inflatable neck support **420**. Suitably, the inflatable supports **410**, **420** are formed from a durable fabric or plastic material. The inflatable lumbar support **410** is positioned in a bottom region B of the first deck support section **110**D (e.g., bottom 20%, 30%, 40%, or 50% of longitudinal length L of the first deck support section **110**D, measured relative to the end of the first deck support section **110**D adjacent the second deck support section **110**C), such that the lumbar support **410** exerts pressure when inflated against the lumbar region of a person laying or sitting on the adjustable bed **10**. Similarly, the inflatable neck support **420** is positioned in a top region T of the first deck support section **110**D (e.g., top 20%, 30%, 40%, or 50% of longitudinal length L of first deck support section **110**D, measured relative to the end of the first deck support section **110**D corresponding to the head end of the adjustable bed **10**), such that the neck support **420** exerts pressure when inflated against the neck region of a person laying or sitting on the adjustable bed **10**. The inflatable lumbar support **410** laterally extends across the first deck support section **110**D and is disposed on an upper surface **112**D of the first deck support section **110**D. Suitably, the inflatable lumbar support **410** and/or the inflatable neck support **420** extends at least 60%, 70%, 80%, or 90% of the mattress support surface **100** lateral width W. In some embodiments, the inflatable lumbar support **410** and/or the inflatable neck support **420** is a single inflatable bladder extending across the first deck support section **110**D (e.g., at least 60%, 70%, 80%, or 90% of the lateral width W of the mattress support surface **200** or the first deck support section **110**D, such as for a twin, queen, or king size bed). In other embodiments, the inflatable lumbar support **410** and/or the inflatable neck support **420** includes a plurality of inflatable bladders **410**A, **410**B and/or **420**A, **420**B extending across the first deck support section **110**D. For example, there can be two separate bladders on adjacent support halves corresponding to a bed section for a first person and a second person such as on a queen, split queen, king, or split king bed **10**. The plurality of bladders can be

in fluid communication so that they inflate/deflate together, or they can be fluidly isolated from each other so that they can be independently inflated and deflated. As specifically shown in FIG. **4**, the bed **10** can further include a means **430** for supplying pressure to the inflatable lumbar support **410** and the inflatable neck support **420**, for example including an air pump or compressor along with suitable valves and tubing (not shown) for independently inflating and deflating the various supports/bladders.

In a particular embodiments shown in FIGS. **5** and **6**, the bed **10** can further include a flexible lumbar pressure distribution member **414** mounted to the first deck support **110**D section and at least partially covering or enclosing the inflatable lumbar support **410**. Similarly, the bed can include an analogous flexible neck pressure distribution member (not shown) mounted to the first deck support section **110**D and at least partially covering or enclosing the inflatable neck support **420**. For example, the pressure distribution member can be a thin but rigid plastic material or sheet that can deform and conform to the curvature of the underlying bladder, but which provides lateral support to laterally distribute the pressure of a person's lumbar/back or head/neck to lessen bladder sag in the region where the person is located. One longitudinal end of the pressure distribution member can be fixedly mounted to the first deck support section **110**D and the opposing longitudinal end can have a floating or sliding mount such as through a sleeve **416** fixedly mounted to the first deck support section **110**D (e.g., where the illustrated sleeve **416** can further accommodate a complementary neck pressure distribution member when present).

FIGS. **7-11** illustrate an embodiment in which the lumbar and neck support system **400** is in the form of a multi-section first deck support section **110**D. The first deck support section **110**D includes a longitudinally extending support frame **114**D (e.g., steel or other metal) pivotally attached to the second deck support section **110**C, a lumbar support deck section **440**, a back support deck section **450**, and a head support deck section **460**. The a back support deck section **450** is fixedly mounted to an upper surface of a middle section of the support frame **114**D. The a lumbar support deck section **440** is pivotally mounted to the second deck support section **110**C and is positioned above an upper surface of a bottom section of the support frame **114**D (e.g., having an opposing free end adjacent the back support deck section **450**). The head support deck section **460** is pivotally mounted to the support frame **114**D and is positioned above an upper surface of a top section of the support frame **114**D (e.g., having an opposing free end at the head end of the bed **10**).

The lumbar and neck support system **400** further includes first, second, and third actuators **462**, **464**, and **466**. The first actuator **462** has a first end **462**A mounted to one or more of the second deck support section **110**C (e.g., a supporting frame member thereof) and the stationary bed frame **200**, and a second end **462**B mounted to the support frame **114**D. The first actuator **462** is adapted to move the support frame **114**D between articulated and substantially flat positions relative to the stationary bed frame **200**. Suitably, the first end **462**A has a fixed pivotal attachment to the second deck support section **110**C and/or the stationary bed frame **200**, and the second end **462**B has a fixed pivotal attachment to the support frame **114**D. The second actuator **464** has a first end **464**A mounted to the support frame **114**D, and a second end **464**B mounted to the lumbar support deck section **440**. The second actuator **464** is adapted to move the lumbar support deck section **440** between articulated and substantially flat positions relative to the support frame **114**D. Suitably, the first end **464**A has a fixed pivotal attachment to the support frame **114**D, and the second end **464**B has a floating pivotal attachment to the lumbar support deck section **440** (e.g., floating wheels or rollers contacting the lumbar support deck section **440**). The third actuator **466** has a first end **466**A mounted to the support frame **114**D, and a second end **466**B mounted to the neck support deck section **460**. The third actuator **466** is adapted to move the neck support deck section **466** between articulated and substantially flat positions relative to the support frame **114**D. Suitably, the first end **466**A has a fixed pivotal attachment to the support frame **114**D, and the second end **466**B has a floating pivotal attachment to the neck support deck section **460** (e.g., floating wheels or rollers contacting the neck support deck section **460**).

Rawls-Meehan U.S. Pat. Nos. 7,321,811, 7,465,280, 7,805,785, 7,930,783, 7,933,669, 7,979,169, 8,019,486, 8,032,263, 8,032,960, 8,046,114, 8,046,115, 8,046,116, 8,046,117, 8,050,805, 8,069,512, 8,078,336, 8,078,337, 8,150,562, 8,375,488, 8,565,934, and 8,682,457 as well as Rawls-Meehan U.S. Publication No. 2012/0057685 and 2014/0325761 are incorporated herein by reference in their entireties and variously disclose mattresses including foam springs or foam cells and materials/configurations therefor, adjustable bed assemblies including adjustable mattress frames, electrical, mechanical, and electronic components associated therewith, and remote controls for use therewith, all of which may be used individually or collectively in combination with the adjustable bed described herein.

Because other modifications and changes varied to fit particular operating requirements and environments will be apparent to those skilled in the art, the disclosure is not considered limited to the example chosen for purposes of illustration, and covers all changes and modifications which do not constitute departures from the true spirit and scope of this disclosure.

Accordingly, the foregoing description is given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as modifications within the scope of the disclosure may be apparent to those having ordinary skill in the art.

All patents, patent applications, government publications, government regulations, and literature references cited in this specification are hereby incorporated herein by reference in their entirety. In case of conflict, the present description, including definitions, will control.

Throughout the specification, where the apparatus, methods, or processes are described as including components, steps, or materials, it is contemplated that the apparatus, methods, or processes can also comprise, consist essentially of, or consist of, any combination of the recited components or materials, unless described otherwise.

PARTS LIST

10 adjustable bed (including mattress support **100**, adjustable frame **200**, mattress **300**, and lumbar and neck support system **400**)

20 adjustable foundation (including mattress support **100**, adjustable frame **200**, and lumbar and neck support system **400**)

100 mattress support (or deck) surface

110 deck support (sections **110**A-D as foot, leg, bottom, and back/head portions; longitudinally opposed ends **110**A_1 and **110**A_2, **110**B_1 and **110**B_2, **110**C_1 and **110**C_2, **110**D_1 and **110**D_2)

112 top surface of deck support (sections **112**A-D as for deck support)
200 adjustable (bed) frame
210 frame support (sections **210**A-D as for deck support)
220 support member
230 subframe
240 actuator or movement/articulation means
250 adjustable bed controller
300 mattress (**300**A: foot end; **300**D: head end)
305 containment frame
310 base
320 sidewalls
330 endwalls
340 foam cells or foam springs
400 lumbar and neck support system
410 lumbar support structure
414 flexible lumbar pressure distribution member
416 sleeve
420 neck support structure
430 means for supplying pressure
440 lumbar support deck section
450 back support deck section
460 neck support deck section
462, **464**, **466** first, second, and third actuators
X (local) lateral direction
Y (local) longitudinal direction
Z (local) normal direction
P pivot axis
Θ angle of articulation between adjacent sections

What is claimed is:

1. An adjustable bed comprising:

(a) a stationary bed frame; and

(b) a mattress support surface supported by the stationary bed frame and comprising (i) a first deck support section corresponding to a back and head portion of the mattress support surface, and (ii) a second deck support section pivotally attached to the first deck support section;

the first deck support section comprising:

a longitudinally extending support frame pivotally attached to the second deck support section;

a back support deck section fixedly mounted to an upper surface of a middle section of the support frame;

a first actuator having (A) a first end mounted to one or more of the second deck support section and the stationary bed frame, and (B) a second end mounted to the support frame, wherein the first actuator is adapted to move the support frame between articulated and substantially flat positions relative to the stationary bed frame;

a lumbar support deck section pivotally mounted to the second deck support section and positioned above an upper surface of a bottom section of the support frame; and

a second actuator having (A) a first end mounted to the support frame, and (B) a second end mounted to the lumbar support deck section, wherein the second actuator is adapted to move the lumbar support deck section between articulated and substantially flat positions relative to the support frame.

2. The adjustable bed of claim **1**, wherein the first end of the first actuator has a fixed pivotal attachment to the one or more of the second deck support section and the stationary bed frame, and the second end of the first actuator has a fixed pivotal attachment to the support frame.

3. The adjustable bed of claim **1**, wherein the first end of the second actuator has a fixed pivotal attachment to the support frame, and the second end of the second actuator has a floating pivotal attachment to the lumbar support deck section.

4. The adjustable bed of claim **1**, wherein:

the first deck support section further comprises: a neck support deck section pivotally mounted to the support frame and positioned above an upper surface of a top section of the support frame, and a third actuator having (A) a first end mounted to the support frame, and (B) a second end mounted to the neck support deck section, wherein the third actuator is adapted to move the neck support deck section between articulated and substantially flat positions relative to the support frame,

the first end of the third actuator has a fixed pivotal attachment to the support frame, and

the second end of the third actuator has a floating pivotal attachment to the neck support deck section.

5. The adjustable bed of claim **1**, wherein the mattress support surface further comprises (iii) a third deck support section pivotally attached to the second deck support section, and (iv) optionally a fourth deck support section pivotally attached to the third deck support section.

6. The adjustable bed of claim **1**, further comprising a mattress positioned above the mattress support surface.

7. The adjustable bed of claim **6**, wherein the mattress is selected from the group consisting of a spring mattress, a coil mattress, a memory foam mattress, and an air mattress.

8. The adjustable bed of claim **1**, wherein the adjustable bed comprises first and second mattress support surfaces arranged in a side-by-side configuration, and first and second lumbar support deck sections positioned on the respective first deck support sections.

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