



A POSITIONING MECHANISM

Field of Invention

The present invention relates generally to a positioning mechanism for use with a mattress.

Background

Residences in many cities around the world are getting smaller. This has led to insufficient space for conventional furniture or insufficient space for moving around when conventionally-sized furniture are used. This in turn has led to an industry catering to providing retractable or collapsible furniture for stowing, and in some cases concealing, the furniture when not in use. One of such furniture in issue is the bed which usually occupies the most space in a typical bedroom. Retractable beds exist and work on a myriad of mechanism, for example drawstrings and springs, for enabling the bed, or in some cases mattresses, to be retracted and deployed. However, structural deficiencies together with the weight of the mattress have contributed to deficiencies and damage to these retractable beds. Leg structures have been incorporated to the retractable bed which provides additional support for the mattress when the retractable bed is deployed. However, these leg structures have to be manually positioned during deployment of the retractable bed for use and is subjected to being moved out of position when a user accidentally hits the leg structures when moving in its proximity. Therefore, there exists a need for a solution to the above described problem.

Summary

In accordance with a first aspect of the invention, there is disclosed a positioning mechanism comprising a first support structure, a platform structure, an actuator and a second support structure. The platform structure is rotatably coupled to the first support structure at a pivot and displaceable between a lowered position and a raised position with the first support structure for supporting the platform structure from a surface. The platform structure having a first end and a second end and is adaptable for supporting a mattress thereon. The actuator extends between the first support structure and the first end of the platform structure for biasing the platform structure towards the raised position. The second support structure is



rotatably coupled substantially adjacent the second end of the platform structure with the second support structure being further coupled to the first support structure for displacement thereof between an outward position and an inward position when the platform structure is displaced towards the lowered position and the raised position respectively. The platform structure extends between and is supported by the first support structure and the second support structure when in the lowered position to thereby dispose the mattress substantially parallel the surface.

In accordance with a second aspect of the invention, there is disclosed a bed system comprising a first positioning mechanism, a second positioning mechanism and a bed-frame. The bed-frame inter-couples the first positioning mechanism and the second positioning mechanism with the bed-frame being shaped and dimensioned for supporting a mattress thereon. Each of the first positioning mechanism and the second positioning mechanism comprises a first support structure, a platform structure, an actuator and a second support structure. The platform structure is rotatably coupled to the first support structure at a pivot and is displaceable between a lowered position and a raised position, the first support structure for supporting the platform structure from a surface. The platform structure has a first end and a second end. The actuator extends between the first support structure and the first end of the platform structure for biasing the platform structure towards the raised position. The second support structure is rotatably coupled substantially adjacent the second end of the platform structure with the second support structure being further coupled to the first support structure for displacement thereof between an outward position and an inward position when the platform structure is displaced towards the lowered position and the raised position respectively. The platform structure extends between and is supported by the first support structure and the second support structure when in the lowered position. The bed-frame is disposed between and coupled to the platform structure of the first positioning mechanism and the platform structure of the second positioning mechanism for being displaceable substantially parallel and substantially perpendicular the surface when the platform structure of each of the first positioning mechanism and the second positioning mechanism is correspondingly displaced to the lowered position and the retracted position respectively.

Brief Description of the Drawings

FIG. 1 illustrates a partial side elevation of a positioning mechanism according to an embodiment of the invention with a platform structure in a lowered position and a second support structure in an outward position;

FIG. 2 illustrates a partial side elevation of the positioning mechanism of FIG. 1 with the platform structure substantially in a raised position and the second support structure in an inward position;

FIG. 3 illustrates a partial front elevation of a pair of the positioning mechanism of FIG. 1 with a bed-frame disposed therebetween and the platform structure and the second support structure of each thereof in the lowered position and the outward position respectively;

FIG. 4 illustrates a side elevation of a first support structure of the positioning mechanism of FIG. 1 configured with an actuator and the platform structure in the lowered position; and

FIG. 5 illustrates a side elevation of a first linkage and a second linkage configured with the platform structure for coupling the second support structure to the first support structure of FIG. 4.

Detailed Description

An exemplary embodiment of the present invention, a positioning mechanism 20 for use with a mattress 22, is described hereinafter with reference to FIG. 1. The positioning mechanism 20 comprises a first support structure 24 and a platform structure 26 rotatably coupled to the first support structure 24 at a primary pivot 28. The platform structure 26 is for substantially supporting the mattress 22 thereon and is displaceable between a lowered position 30 and a raised position 32. The mattress 22 is preferably substantially horizontal and substantially vertical when the platform structure 26 is in the lowered position 30 and the raised position 32 respectively. When the positioning mechanism 20 is in use, the platform structure 26 is displaced to the lowered position 30 to avail use of the mattress 22 and to the raised position 32 for freeing up space when use of the mattress 22 is not required.

Preferably, the mattress 22 rests on a bed-frame 34 shaped and dimensioned for accommodating the mattress 22. The bed-frame 34 is coupled to the platform structure 26 to enable the mattress 22 to be supported thereon.

The platform structure 26 has a first end 36 and a second end 38 forming extremities thereof. The primary pivot 28 is configured between the first end 36 and the second end 38 of the platform structure 26. The positioning mechanism 20 further comprises an actuator 40 extending between the first support structure 24 and the first end 36 of the platform structure 26 for biasing the platform structure 26 towards the raised position 32. The actuator 40 comprises at least one axially resiliently biased piston or the like prismatic actuator. For example, the actuator 40 comprises a pair of pistons with each thereof being axially resiliently biased pneumatically.

The positioning mechanism 20 further comprises a second support structure 42 rotatably coupled to the second end 38 of the platform structure 26. The second support structure 42 is further coupled to the first support structure 24 for displacement thereof between an outward

position 44 and an inward position 46 when the platform structure 26 is displaced to the lowered position 30 and the raised position 32 respectively. The platform structure 26 extends between and is supported by the first support structure 24 and the second support structure 42 when in the lowered position 30 to thereby dispose the mattress 22 for support by the first support structure 24 and the second support structure 42. Preferably, the first support structure 24 and the second support structure 42 rest on a surface 48 when the platform structure 26 is in the lowered position 30 for spatially displacing the bed-frame 34, and consequently the mattress 22 disposed thereon, from the surface 48.

Further when in use, the bed-frame 34 is coupled to and disposed between a pair of the positioning mechanism 20 for providing and configuratively corresponding a pair of the first support structure 24 and a pair of the second support structure 42 substantially to four corners of the bed-frame 34. The pair of positioning mechanism 20 forming a bed system.

Preferably, the first support structure 24 is a panel supported from the surface 48 and disposed substantially perpendicular a wall (not shown). The panel is made from wood, metal or the like material having sufficient strength when shaped and dimensioned for supporting the mattress 22 and the platform structure 26. The panel is further shaped for forming a portion of a furniture or a cabinet. For example, the panel is made from wood and forms a side of a box-shaped structure dimensioned for substantially receiving the mattress 22 therewithin when the platform structure 26 is in raised position 32. Preferably, the inward position 46 of the second support structure 42 substantially opposes the outward position 44 thereof for enabling the second support structure 42 to be substantially received in box-shaped structure or the like concealment structure for substantially visually conceal the second support structure 42 formed in part by the first support structure 24.

Alternatively, the first support structure 24 comprises a panel structure 50 and an interface plate 52. The panel structure 50 is supported from the surface 48 and disposed substantially perpendicular a wall (not shown) with the interface plate 52 inter-coupling the panel structure

50 and the platform structure 26. Preferably, the primary pivot 28 is formed on the interface plate 52 for coupling with the platform structure 26 and whereabout the platform structure 26 rotatably displaces relative the first support structure 24. Therefore, the interface plate 52 is preferably made of metal or the like wear-resistant material.

When the panel structure 50 forms part of, for example a siding of, the box-shaped structure, the positioning mechanism preferably further comprises a head-board assembly (not shown) configured for concealing at least a portion of the actuator 40 when the platform structure 26 is in the lowered position. The head-board assembly is coupled to the platform structure 26 for moving in tandem therewith and is configured such that when the platform structure 26 is displaced from the lowered position 30 to the raised position 32, the head-board assembly structurally collapses for allowing the box-shaped structure more space for accommodating the platform structure 26 and the mattress 22 supported thereon.

The positioning mechanism 20 further comprises a first linkage 54 and a second linkage 56. The first linkage 54 is preferably slidably coupled to the platform structure 26 for displacement along a longitudinal axis 58 extending between the first end 36 and the second end 38 of the platform structure 26. The first linkage 54 is rotatably coupled to the second support structure 42 at one end thereof. The second linkage 56 is rotatably coupled to a link point 60 on the first support structure 26 at one end thereof and rotatably coupled to the other end of the first linkage 54 at the other end thereof.

Preferably, the distance between the primary pivot 28 and the point where the actuator 40 couples with the first support structure 26 is larger than the distance between the primary pivot 28 and the link point 60.

Structurally, when in use, the Euclidean distance between the link point 60 and the longitudinal axis 58 of the platform structure 26 increases when the platform structure 26 is

displaced from lowered position 30 towards the raised position 32 to thereby displace the first linkage 54 away from the first end 36 and towards the second end 38 of the platform structure 26. The second support structure 42 is displaced from the outward position 44 towards the inward position 46 when the first linkage 54 is displaced away from the first end 36 and towards the second end 38 of the platform structure 26.

Preferably, the second support structure 42 comprises a mounting plate 62, a leg structure 64 extending from the mounting plate 62 and a connector 66 having one end rotatably coupled to the mounting plate 62 and another end rotatably coupled to the first linkage 54. The mounting plate 62 is coupled to the platform structure 26 and is operable for displacing the leg structure 64 between an inward position and an outward position corresponding with the inward position 46 and the outward position 44, respectively, of the platform structure 26. The connector 66 and the mounting plate 62 are so inter-configured to enable the leg structure 64 to travel more than 100 degrees angle when displaced from one to the other of the inward position and the outward position.

The actuator 40 is for providing an actuation force when in use. The actuator 40, the platform structure 26 and the first support structure 24 are inter-configured for substantially balancing moment generated by the weight of the mattress 22 and moment generated by the actuation force of the actuator 40 about the primary pivot 28 when the platform structure 26 is substantially at least one of in the lowered position 30, the raised position 32 and substantially proximal the raised position 32.

In the foregoing manner, a positioning mechanism for use with at least one mattress is described according to one exemplary embodiment of the present invention. Although only one exemplary embodiment of the present invention is disclosed, it will be apparent to a person skilled in the art in view of this disclosure that numerous changes and/or modifications can be made without departing from the scope and spirit of the present invention.

Claims

1. A positioning mechanism comprising:

a first support structure;

a platform structure rotatably coupled to the first support structure at a pivot and displaceable between a lowered position and a raised position, the first support structure for supporting the platform structure from a surface, the platform structure having a first end and a second end and is adaptable for supporting a mattress thereon;

an actuator extending between the first support structure and the first end of the platform structure for biasing the platform structure towards the raised position; and

a second support structure rotatably coupled substantially adjacent the second end of the platform structure, the second support structure further coupled to the first support structure for displacement thereof between an outward position and an inward position when the platform structure is displaced towards the lowered position and the raised position respectively,

wherein the platform structure extends between and is supported by the first support structure and the second support structure when in the lowered position to thereby dispose the mattress substantially parallel the surface.

2. The mechanism as in claim 1, the actuator being at least one axially resiliently biased piston.
3. The mechanism as in claim 1, the first support structure comprising:

a panel structure whereto the platform structure is coupled, the panel structure being supported on the surface and disposed substantially perpendicular a wall.

4. The mechanism as in claim 3, the first support structure further comprising:

an interface plate structurally inter-coupling the panel structure and the platform structure.
5. The mechanism as in claim 3, the panel structure constituting a side of a box structure shaped for substantially receiving and concealing the mattress, the second support structure and a portion of the platform structure when the platform structure is in the raised position and the second support structure is in the inward position.
6. The mechanism as in claim 5, further comprising:

a head-board assembly configured for concealing at least a portion of the actuator when the platform structure is in the lowered position, the head-board assembly being coupled to the platform structure and is structurally collapsible when the platform structure is displaced towards the raised position.
7. The mechanism as in claim 1, further comprising:

a first linkage slidably coupled to the platform structure, the first linkage being rotatably coupled to the second support structure at one end thereof; and

a second linkage rotatably coupled to a link point on the first support structure at one end and rotatably coupled to the other end of the first linkage at the other end thereof, the Euclidean distance between the link point and the longitudinal axis of the platform structure increases when the platform structure is displaced from lowered position towards the raised position to thereby displace the first linkage away from the first end and towards the second end of the platform structure, the second support structure is displaced from the outward position towards the inward position when the first linkage is displaced away from the first end and towards the second end of the platform structure.

8. The mechanism as in claim 1, the platform structure forming a portion of a bed-frame whereon the mattress is supported.
9. The mechanism as in claim 8, the bed-frame comprising:
 - a concealment panel for substantially concealing the bed-frame when the platform structure is in the raised position.
10. The mechanism as in claim 1, the actuator providing an actuation force and the actuator, the platform structure and the first support structure being inter-configured for substantially balancing the moment generated by the weight of the mattress and the moment generated by the actuation force of the actuator about the pivot when the platform structure is substantially at least one of in the lowered position, the raised position and substantially proximal the raised position.
11. A bed system comprising:
 - a first positioning mechanism;
 - a second positioning mechanism; and
 - a bed-frame inter-coupling the first positioning mechanism and the second positioning mechanism, the bed-frame being shaped and dimensioned for supporting a mattress thereon, each of the first positioning mechanism and the second positioning mechanism comprising:
 - a first support structure;
 - a platform structure rotatably coupled to the first support structure at a pivot and displaceable between a lowered position and a raised position, the

first support structure for supporting the platform structure from a surface, the platform structure having a first end and a second end;

an actuator extending between the first support structure and the first end of the platform structure for biasing the platform structure towards the raised position; and

a second support structure rotatably coupled substantially adjacent the second end of the platform structure, the second support structure further coupled to the first support structure for displacement thereof between an outward position and an inward position when the platform structure is displaced towards the lowered position and the raised position respectively, the platform structure extends between and is supported by the first support structure and the second support structure when in the lowered position,

wherein the bed-frame is disposed between and coupled to the platform structure of the first positioning mechanism and the platform structure of the second positioning mechanism for being displaceable substantially parallel and substantially perpendicular the surface when the platform structure of each of the first positioning mechanism and the second positioning mechanism is correspondingly displaced to the lowered position and the retracted position respectively.