

PULL-DOWN BED ASSEMBLY

The present invention relates to a pull-down bed assembly for a double bed.

Pull-down beds are generally constituted by a piece of furniture that contains a tilting frame, which constitutes the bedspring.

5 The bedspring is generally constituted by a structure made of welded steel tubes, which includes rotation pivots provided with springs which are adjustable as a function of the load.

The bedspring generally has two resting feet and brackets for fixing the wooden closure panel.

10 The bedspring also has a mattress retainer and normally a springing system with laminar wood slats inserted in adapted seats of the longitudinal members of the bedspring.

Pull-down beds, or Murphy beds, are commercially available since the early 1900s and many different structures with constructive and functional improvements have been
15 proposed over time.

An important requirement of a pull-down bed is to be constructively sturdy and reliable and to ensure its locking both in the horizontal position, for use as a bed, and when it is closed in the vertical position.

Another important requirement of a pull-down bed is to ensure a simple and easy
20 actuation, which does not force the user to make excessive efforts.

Another fundamental requirement of a pull-down bed is that it should occupy a limited space because this type of furniture is used indeed where the available space is limited.

It is difficult to provide a structure that is constructively simple, is space saving, is
25 easy to operate and is at the same time sturdy and reliable.

Commercially available pull-down beds in fact are unlikely to fully meet all the above cited requirements simultaneously.

Also, conventional pull-down beds are generally designed to be kept normally in the vertical closed position, and to be lowered into the horizontal position, for use as a bed,
30 when required.

DE-2524403 discloses a pull down bed wherein the bedspring is normally contained in a cabinet and provided with a spring assisted tilting mechanism.

US2008/163421 discloses a piece of furniture including a Murphy bed comprising a spring tilting mechanism.

5 The aim of the present invention is to provide a pull-down bed assembly that in the horizontal position constitutes a normal double bed and when necessary can be lifted and arranged in the vertical position.

Within the scope of this aim, an object of the invention is to provide a pull-down bed assembly constituted by a self-supporting structure.

10 A further object of the invention is to provide a pull-down bed assembly in which all the motion control mechanisms are completely concealed from sight.

A further object of the invention is to provide an assembly that ensures the stability of both the vertical position and the horizontal position.

15 A further object of the invention is to provide an assembly that can be moved from one position to the other simply and easily.

A further object is to provide an assembly that is aesthetically pleasant and occupies a limited space.

20 A further object of the present invention is to provide a structure which, by virtue of its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use.

This aim and these and other objects which will become better apparent hereinafter are achieved by a pull-down bed assembly as claimed in the appended claims.

25 Further characteristics and advantages will become better apparent from the description of preferred but not exclusive embodiments of the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the pull-down bed assembly, according to the present invention, shown in the open position;

Figure 2 is a perspective view of the pull-down bed assembly shown in the vertical position;

30 Figure 3 is a front view of the assembly shown in the vertical position;

Figure 4 is a side view of the assembly shown in the vertical position;

Figure 5 is a side view of the assembly shown in the horizontal position;

Figure 6 is a plan view of the assembly shown in the horizontal position;

Figure 7 is a front view of the assembly shown in the horizontal position;

5 Figure 8 is a front view, in enlarged scale with respect to the preceding ones, which shows the pivoting region of the movable frame, shown in the horizontal position;

Figure 9 is a view, similar to the preceding one but showing the movable frame in the vertical position;

Figure 10 is a front view of the pivoting region of the left part of the assembly;

10 Figure 11 is a front view of the pivoting region of the right part of the assembly;

Figure 12 is a plan view of the pivoting region of the left part of the assembly;

Figure 13 is a plan view of the pivoting region of the right part of the assembly;

Figure 14 is a perspective view of the pull-down bed assembly, according to a second embodiment of the invention, shown in the open position;

15 Figure 15 shows the assembly of the preceding figure during a first step of the lifting action for bringing the assembly to the closed vertical position;

Figure 16 shows the assembly during a further step of the lifting action;

Figure 17 is a perspective view of the pull-down bed assembly shown in the final vertical position;

20 Figure 18 is a side section view of the assembly according to the second embodiment, shown in the vertical, or closed, position;

Figure 19 is a side view, of the assembly of the preceding figure according to a different section plane;

25 Figure 20 is a side section view, similar to the preceding one, but showing the assembly in the open horizontal position;

Figure 21 is a partially sectional front view of the assembly of the preceding figure;

Figure 22 is an enlarged side section view of the assembly according to the second embodiment, shown in the vertical position;

30 Figure 23 is a side section view, similar to the preceding one, but showing the assembly in the horizontal position;

Figure 24 is a partial front view of the assembly showing the one of the lateral supports;

Figure 25 is a partial top section view of the assembly showing one side of the feet bar;

5 Figure 26 is a partial perspective view of the movable frame.

With reference to the cited figures, the pull-down bed assembly according to a first aspect of the invention, generally designated by the reference numeral 1, comprises a movable frame 2, which constitutes the bedspring and is pivoted to a fixed frame 3, in such a manner as to define a closed position, shown in Figure 2, in which the movable
10 frame 2 is substantially in a vertical position, and an open position, for use as a bed, shown in Figure 1, in which the movable frame 2 is in the horizontal position and rests on the ground by means of a feet bar 4.

The movable frame or bedspring 2 is pivoted to the fixed frame 3 by means of a pair of mounting plates 5, which constitute the fixed frame 3 together with connecting
15 cross-members.

Each shoulder 5 has an upright 7 provided with a seat for a rotation pivot, which is integral with the movable frame 2.

The rotation pivots allow the rotation of the movable frame 2 about a rotation axis 8, which passes through the pivots and is frontally arranged, with respect to the rear cross-
20 member 9 of the movable frame 2.

The movement of the movable frame 2 is controlled by a balancing system constituted by a pair of springs 10 and 11, which are integral with the fixed frame 3.

Each spring 10 and 11 is connected to a side of the movable frame 2 by means of a respective transmission mechanism 12.

25 The first spring 10, which is arranged in a horizontal position and is extended transversely in the fixed frame 3, includes a fixed end 13, which is associated with the fixed frame 3 by means of an adjustment screw 14, and a movable end 15, which is connected to a first end of a cable 16 whose second end is fixed to the movable frame 2.

The second end of the cable 16 is fixed to an arm 17, which is integral with the rear
30 cross-member 9 of the movable frame 2.

The cable 16 is guided by means of two pulleys: a pulley with a vertical axis 18 and a pulley with a horizontal axis 19.

The second spring 11 is arranged in a horizontal position and is extended transversely in the fixed frame 3, parallel to the first spring 10.

5 The second spring 11 has a fixed end 113, which is associated with the fixed frame 3 by means of an adjustment screw 114, and a movable end 115, which is connected to a first end of a cable 116, whose second end is fixed to the movable frame 2.

The second end of the cable 116 is fastened to an arm 117, which is integral with the rear cross-member 9 of the movable frame 2.

10 The cable 116 is guided by means of two pulleys: a pulley with a vertical axis 118 and a pulley with a horizontal axis 119.

In the open horizontal position of the movable frame 2, the springs 10 and 11 are under tension.

15 The springs are sized so as to counterbalance the weight of the movable frame 2, so that the lifting action of the movable frame is facilitated and requires only a minimal effort.

The stability of the closed vertical position of the movable frame is ensured by the traction force applied by the springs, which still allow to lower the frame without excessive effort.

20 The movable frame is covered by a panel 20 made of wood or other suitable material and supports a bedspring, provided for example by means of slats, which are not visible in the drawings and on which a mattress 30 rests.

The feet of the movable frame 2 are constituted by a U-shaped bar 4.

25 The fixed frame 3 is covered at the front by a casing 21 and at the rear by a headboard 22.

The casing 21 is extended laterally beyond the contour of the movable frame 2 and constitutes bedside tables which are integrated in the assembly.

The headboard 22 has a box-like structure and contains an iron bar 6.

30 In practice it has been found that the invention achieves the intended aim and objects.

The pull-down bed assembly, equipped with bedside table portions, is adapted to be placed in a double bedroom.

In the horizontal position, the assembly constitutes a normal double bed of contemporary design without containment shoulders, with the rotation fulcrum and the
5 balancing system hidden.

When needed, the assembly can be closed in the vertical position by directly gripping the wood panel that covers the bedspring.

The assembly according to the present invention is self-supporting, by virtue of the weight of the headboard and of the casing, which are preferably made of wood, and by
10 virtue of the presence of the iron bar inserted in the headboard.

The wood superstructures, i.e., the panel 20, can be associated with the movable frame 2 of the bedspring without the aid of hardware.

According to the present invention, the movement mechanism, the fulcrums and the supports made of metal are not visible.

15 The spring-based balancing system is arranged in a rear position with respect to the face of the bed, when the bedspring is in the vertical position, so that no additional covering is needed to conceal it from sight.

Figures 14-25 show a second embodiment of the pull-down bed assembly according to the invention, globally designated by the reference numeral 201.

20 The assembly 201 comprises a movable frame 202, which constitutes the bedspring and is pivoted to a fixed frame 203, in such a manner as to define a closed position, shown in Figure 17, in which the movable frame 202 is substantially in a vertical position, and an open position, for use as a bed, shown in Figure 14, in which the movable frame 202 is in the horizontal position and rests on the ground by means of a
25 feet bar 204.

The movable frame or bedspring 202 is pivoted to the fixed frame 203 by means of pivots 208 pivoted to a pair of uprights 207, which are associated with the fixed frame 203 through a base member 205.

The pivots 208 allow the rotation of the movable frame 202 about a rotation axis,
30 which passes through the same pivots.

The pivots 208 are arranged at a distance from a rear cross-member 209 of the movable frame 202.

The movable frame 202 is constituted by said rear cross-member 209 connected to a front cross-member 299 by means of two side beams 240.

5 The bedspring may be constituted by slats 241 or by a traditional spring, on which a mattress 30 rests.

The movable frame is covered by a panel 220, made of wood or other suitable material.

10 The motion of the movable frame 202 is controlled by a balancing system constituted by a pair of springs 210.

Each spring 210 is inserted in a respective side beam 240 and each spring 210 is connected to a respective transmission mechanism 212.

15 Each spring 210 has a fixed end 213 connected to the movable frame by means of an adjustment screw, and a movable end 215, which is connected to a first end of a cable 216 whose second end 214 is fixed to the fixed frame 203.

The second end 214 of the cable 216 is fixed to a bracket 217 which is fastened to the base member 205.

The cable 216 is guided by means of two pulleys: a fixed pulley 218 and a movable pulley 219.

20 The fixed pulley 218 is fastened to the base member 205 while the movable pulley 219 is fastened at the movable frame 202.

This arrangement of the pulleys puts the springs 210 under tension when the movable frame is in the horizontal position because of the tension applied by the cables 216.

25 The springs are sized so as to counterbalance the weight of the movable frame 202, so that the lifting action of the movable frame is facilitated and requires only a minimal effort.

30 The stability of the closed vertical position of the movable frame is ensured by the traction force applied by the springs, which still allow to lower the frame without excessive effort.

The feet bar 204 is constituted by a U-shaped bar having its ends pivoted to the movable frame 202.

Each pivot end of the feet bar is provided with a gear wheel 221 which engages a respective rack 222. The rack 222 slides within its side beam 240 thus making the gear
5 wheel 221 rotate in order to move the feet bar from a working position, at right angle with the movable frame 202, to a retracted position, parallel to the frame 202.

The rack 222 is controlled by a lever system 223 which is contained in the side beams 240 of the movable frame 202 and is connected to the upright 207.

The lever system causes the rack to slide when the movable frame 202 is rotated
10 about its pivots 208 from the horizontal position to the vertical position and vice versa.

When the movable frame is in the vertical position, shown in figures 17-19, the feet bar 204 is completely contained within the movable frame which is provided with a front and side covers 231 that extend along the sides and front of the movable frame.

The side cover 231 also conceals from view the uprights 207 when the movable
15 frame 202 is in the vertical position, as better appreciated in figures 17-19.

In practice it has been found that the invention achieves the intended aim and objects.

The pull-down bed assembly, which may be equipped with bedside table portions, as in the embodiment illustrated in figure 1-13, is adapted to be placed in a double
20 bedroom.

In the horizontal position, the assembly constitutes a normal double bed of contemporary design without containment shoulders, with the rotation fulcrum and the balancing system hidden.

When needed, the assembly can be closed in the vertical position by directly
25 gripping the wood panel that covers the bedspring.

The assembly according to the present invention is self-supporting, by virtue of the weight of the headboard and of the casing, which are preferably made of wood, and by virtue of the iron bar inserted in the headboard.

The wood superstructures, i.e., the panel 20, can be associated with the movable
30 frame 2 of the bedspring without the aid of hardware.

According to a particular aspect of the present invention, the motion mechanism, the fulcrums and the supports made of metal are not visible.

The spring-based balancing system is arranged in a completely hidden location, either behind the face of the bed or in the movable frame, when the bedspring is in the
5 vertical position, so that no additional covering is needed to conceal it from sight.

According to the embodiment shown in figures 14-26, when the pull down bed is in the vertical position, the only visible feature is the panel 220, as better appreciated in figure 17.

This application claims the priority of Italian Patent Application No.
10 MI2010A000630, filed on April 14, 2010, the subject matter of which is incorporated herein by reference.

CLAIMS

1. A pull-down bed assembly, comprising a movable frame which constitutes the bedspring and is pivoted to a fixed frame so as to define a closed vertical position, in which said movable frame is substantially in a vertical position, and an open horizontal position, for use as a bed, in which said movable frame is in the horizontal position; said assembly being characterized in that it comprises a balancing system, which is adapted to control the motion of said movable frame with respect to said fixed frame and is constituted by one or more springs and by a respective transmission mechanism, which are arranged within said fixed frame and said movable frame and are not visible from the outside both in said closed vertical position and in said open horizontal position of said movable frame.

2. The assembly according to claim 1, characterized in that said movable frame is pivoted to said fixed frame by means of a pair of mounting plates, which constitute said fixed frame together with connecting cross-members; each of said shoulders comprises an upright having a seat for a rotation pivot which is integral with said movable frame; said rotation pivots allow a rotation of said movable frame about a rotation axis that passes through said pivots and is arranged at the front with respect to a rear cross-member of said movable frame.

3. The assembly according to claim 2, characterized in that said balancing system is constituted by a first helical spring and a second helical spring, said springs being integral with said fixed frame; each of said springs is connected to one side of the movable frame by means of a respective transmission mechanism; said first spring is arranged in a horizontal position and is extended transversely in said fixed frame parallel to said second spring; each one of said springs comprises a fixed end, which is associated with said fixed frame by means of an adjustment screw, and a movable end, which is connected to a first end of a cable; the second end of said cable is fixed to said movable frame; said second end of said cable is fixed to an arm which is integral with said rear cross-member of said movable frame; said cable is guided by means of two pulleys, one having a vertical axis and one having a horizontal axis.

4. The assembly according to one or more of the preceding claims, characterized in

that said movable frame is covered by a panel, made of wood or other suitable material, and said fixed frame is covered at the front by a box-like body and at the rear by a headboard.

5 5. The assembly according to one or more of the preceding claims, characterized in that said box-like body is extended laterally beyond the lateral space occupation of said movable frame and constitutes bedside tables which are integrated in the assembly.

6. The assembly according to claim 1, characterized in that said movable frame is pivoted to said fixed frame by means of pivots pivoted to a pair of uprights, which are associated with said fixed frame through a base member; said pivots allow the rotation of
10 said movable frame about a rotation axis, which passes through said pivots; said pivots are arranged at a distance from a rear cross-member of said movable frame.

7. The assembly according to claim 6, characterized in that said movable frame is constituted by said rear cross-member connected to a front cross-member by means of two side beams.

15 8. The assembly according to claim 7, characterized in that said balancing system comprises a pair of springs; each of said spring is inserted in a respective side beam and each spring is connected to a respective transmission mechanism; each spring has a fixed end, connected to said movable frame, and a movable end, which is connected to a first end of a cable; a second end of said cable is fixed to the fixed frame; said second
20 end of said cable is fixed to a bracket, which is fastened to said base member; said cable is guided by means of two pulleys: a fixed pulley and a movable pulley; said fixed pulley is fastened to said base member while said movable pulley is fastened at said movable frame.

9. The assembly according to claim 8, characterized in that said feet bar is
25 constituted by a U-shaped bar having its ends pivoted to said movable frame; said pivot ends are connected to a motion control mechanism that moves said feet bar from a retracted position, when said movable frame is in said vertical position, to a working extended position, at right angle with said movable frame, when said movable frame is in said horizontal position, and from said extended position to said retracted position when
30 said movable frame moves from said horizontal position to said vertical position.

10. The assembly according to claim 9, characterized in that each pivot end of said feet bar is provided with a gear wheel which engages a respective rack; said rack slides within its side beam thus making the gear wheel rotate in order to move said feet bar from said working extended position to said retracted position, parallel to said frame; said rack
5 is controlled by a lever system which is contained in said side beam of said movable frame and is connected to said upright; said lever system causes said rack to slide when said movable frame is rotated about its pivots from said horizontal position to said vertical position and vice versa.

11. The assembly according to claim 9, characterized in that, when said movable
10 frame is in said vertical position, said feet bar is completely contained within said movable frame which is provided with a front and side covers that extend along the sides and front of said movable frame.

12. The assembly according to claim 11, characterized in that said side cover also conceals from view said uprights when said movable frame is in said vertical position.

13. The assembly according to one or more of the preceding claims, characterized
15 in that in said horizontal position of said movable frame said springs are under such a tension as to counterbalance the weight of said movable frame.

14. The assembly according to one or more of the preceding claims, characterized in that it is self-supporting, i.e., it is not fastened to any external support.