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(54) **ULTRA-THIN FOLDABLE BED FRAME**

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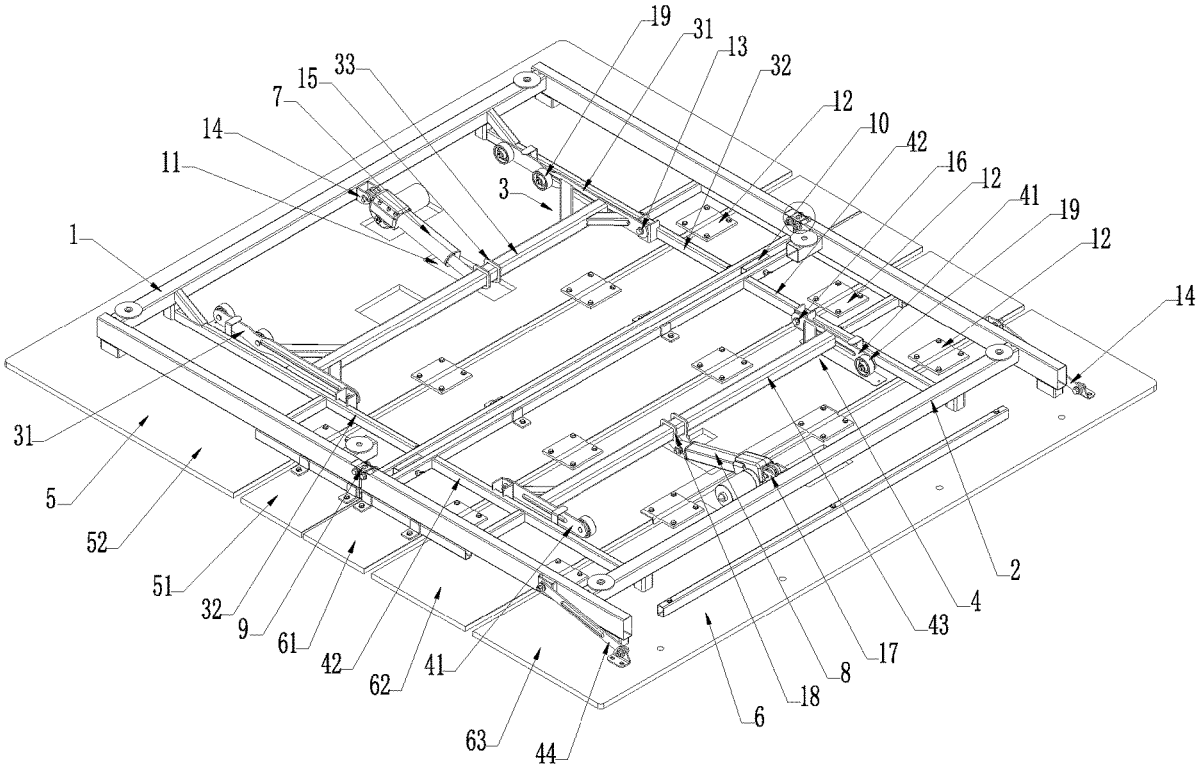
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(57) **ABSTRACT**

The ultra-thin foldable bed frame includes a front frame and a rear frame that are rotatably connected to each other, a front push rod assembly and a rear push rod assembly respectively disposed on the front frame and the rear frame, a front bed board assembly and a rear bed board assembly respectively laid on the front push rod assembly and the rear push rod assembly, a front frame driving motor, and a rear frame driving motor. The front push rod assembly and the rear push rod assembly are respectively connected to the front frame driving motor and the rear frame driving motor. When the driving motors are at the initial position, the front frame, the rear frame, the push rod assemblies, and the driving motors are all fall within the range of the thicknesses of the front frame and the rear frame.



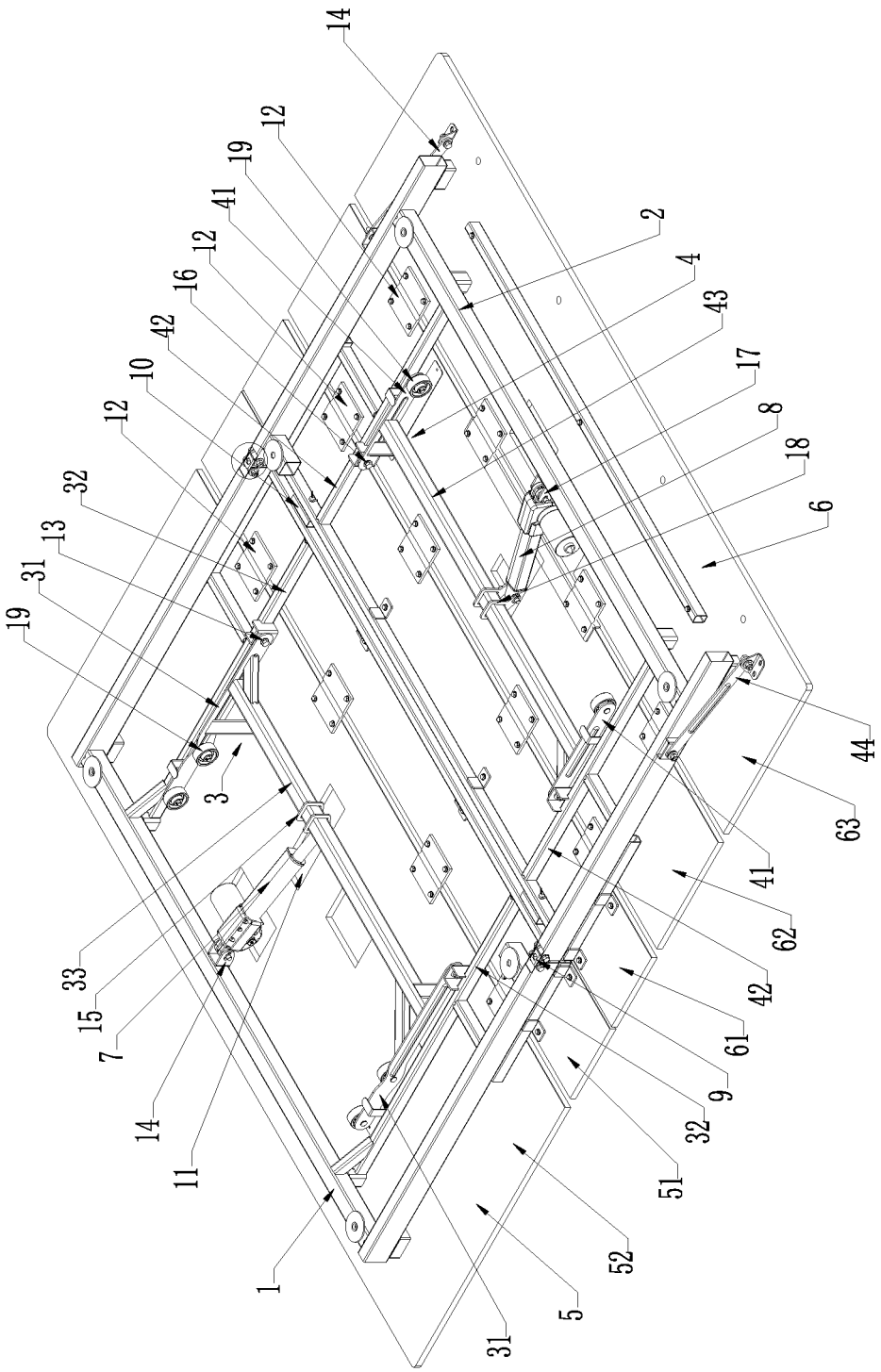

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FIG. 1

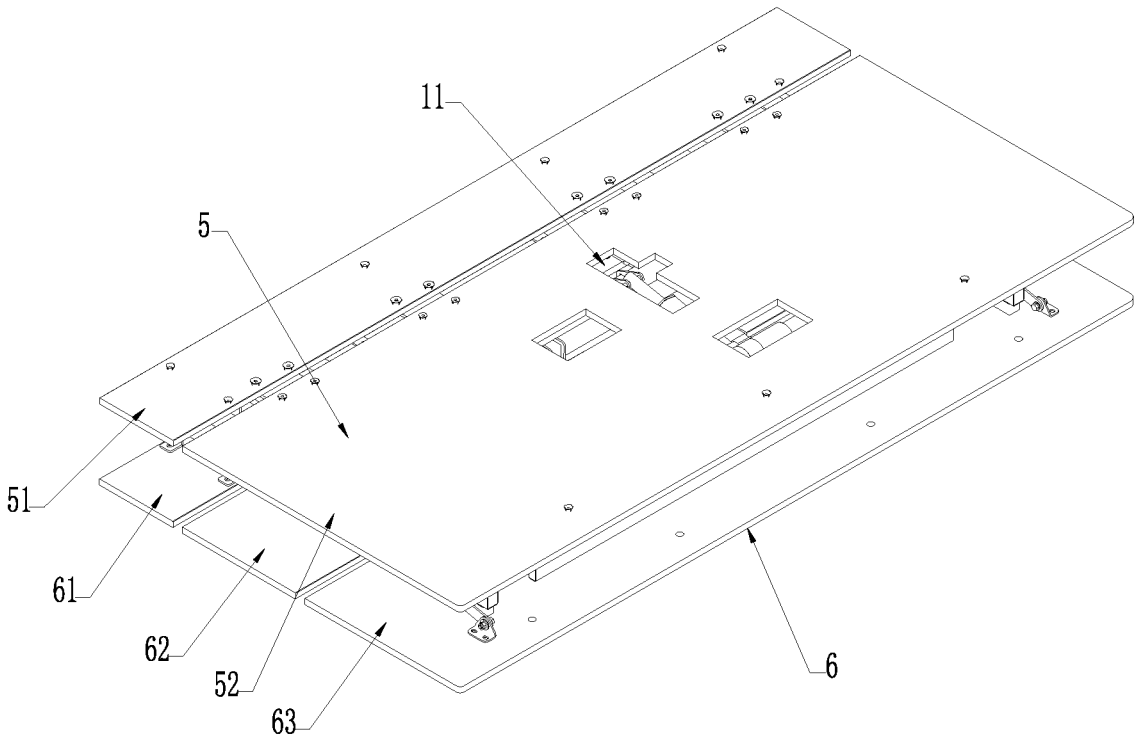


FIG. 2

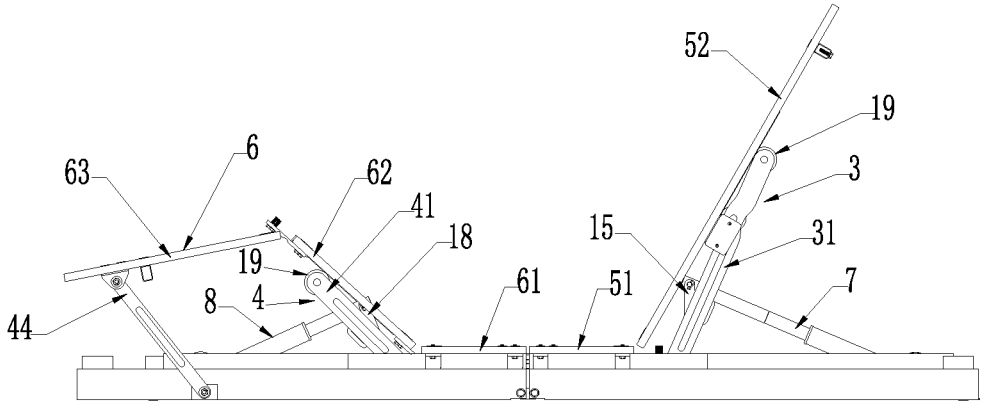


FIG. 3

ULTRA-THIN FOLDABLE BED FRAME

TECHNICAL FIELD

[0001] The present invention relates to the field of functional furniture, and is specifically an ultra-thin foldable bed frame that has split bed boards and that may be folded or unfolded as required.

BACKGROUND

[0002] With the improvement of living standards, people have increasing high requirements for comfort of bed frames. Therefore, foldable bed frames come into being. Such bed frames are usually driven by one or more motors to be bent and folded at different angles according to a predetermined trajectory, to provide support for lying, semi-recumbent, and sitting of people.

[0003] Current foldable bed frames generally have the following problems:

[0004] 1. Since driving parts of the foldable bed frame are higher than frame parts, the foldable bed frame requires bed legs to lift the frames off the ground and provide enough space for the driving parts, thereby ensuring that the driving parts of the foldable bed frame do not interfere with the ground during transformation of postures.

[0005] 2. In order to facilitate transportation, the bed legs and the foldable bed frame are usually separately transported. Before use, users need to mount the bed legs to the foldable bed frame. Since the foldable bed frame is heavy, physical efforts are required to mount the bed legs to the foldable bed frame, degrading comfort experience of users.

[0006] 3. After the foldable bed frame is lifted from the ground, dust is likely to accumulate in a gap between the ground and a foldable bed frame support, affecting health of users.

SUMMARY

[0007] In order to overcome the foregoing disadvantages, the present invention provides a foldable bed frame having a compact structure so that the driving parts and movable parts of the bed frame will cause no interference to a place under the bed frame during movement.

[0008] In order to achieve the foregoing objectives, the present invention is implemented as follows.

[0009] An ultra-thin foldable bed frame includes a front frame and a rear frame that are rotatably connected to each other, a front push rod assembly and a rear push rod assembly respectively disposed on the front frame and the rear frame, a front bed board assembly and a rear bed board assembly respectively laid on the front push rod assembly and the rear push rod assembly, and a driving motor. The front push rod assembly and the rear push rod assembly are connected to the driving motor and configured to drive the bed board assemblies to be folded upward under driving of the driving motor. When the driving motor is at an initial position, the front frame, the rear frame, the push rod assemblies, and the driving motor all fall within a range of the thicknesses of the front frame and the rear frame.

[0010] The foldable bed frame adopts the foregoing structure. When the front frame and the rear frame are unfolded flat, all movable components do not exceed the thicknesses of the front frame and the rear frame, so that the entire foldable bed frame can be directly landed by using the front frame and the rear frame. In this way, the foldable bed frame can be directly placed on the ground without bed legs.

[0011] Further, the driving motor includes a front frame driving motor and a rear frame driving motor, and the two driving motors are respectively disposed in the front frame and the rear frame and configured to drive the front push rod assembly and the rear push rod assembly to move. In this way, the arrangement of the dual driving motors simplifies overall complexity of the push rod assemblies of the front frame and the rear frame, facilitating reliability of the foldable bed frame.

[0012] Further, the ultra-thin foldable bed frame further includes two intermediate links. The two intermediate links rotatably connect the front frame to the rear frame on two sides, so that the front frame and the rear frame are foldable inward by using the intermediate links. In this way, the front frame and the rear frame are prevented from colliding or interfering with each other during folding and storage, facilitating operations for a user.

[0013] Further, the ultra-thin foldable bed frame further includes a cushion block disposed on the front frame or the rear frame. When the front frame and the rear frame are unfolded, a gap between the front frame and the rear frame is filled by using the cushion block, so that the front frame and the rear frame are kept horizontally unfolded and free from downwarping.

[0014] In the ultra-thin foldable bed frame, a window is provided on each of the front bed board assembly and the rear bed board assembly to avoid interference between the driving motor and the bed board assemblies and minimize a thickness of the entire foldable bed frame.

[0015] In the ultra-thin foldable bed frame, the front push rod assembly includes a pair of first rotating rods and a pair of first fixing rods respectively disposed on two sides of the front frame, the first fixing rods are fixedly connected to the front frame, and the first rotating rods are rotatably connected to the first fixing rods through first pins, the front push rod assembly further includes a first transverse rod, and two ends of the first transverse rod are respectively fixedly connected to the first rotating rods, a first connecting seat is fixed on the front frame, a second connecting seat is fixed on the first transverse rod, and two ends of the front frame driving motor are respectively rotatably connected to the first connecting seat and the second connecting seat, so that when the front frame driving motor extends out, the front frame driving motor drives the first rotating rods to rotate around the first pins relative to the first fixing rods, and the first rotating rods push the front bed board assembly to be folded upward.

[0016] In the ultra-thin foldable bed frame, the front bed board assembly includes a first fixed bed board and a first movable bed board, and the first movable bed board is rotatably connected to the first fixed bed board through hinges, so that when the front frame driving motor extends out, the first rotating rods push the first movable bed board to be folded upward relative to the first fixed bed board.

[0017] In the ultra-thin foldable bed frame, the rear push rod assembly includes a pair of second rotating rods and a pair of second fixing rods respectively disposed on two sides of the rear frame, the second fixing rods are fixedly connected to the rear frame, and the second rotating rods are rotatably connected to the second fixing rods through second pins, the rear push rod assembly further includes a second

transverse rod, and two ends of the second transverse rod are respectively fixedly connected to the second rotating rods, a third connecting seat is fixed on the rear frame, a fourth connecting seat is fixed on the second transverse rod, and two ends of the rear frame driving motor are respectively rotatably connected to the third connecting seat and the fourth connecting seat, so that when the rear frame driving motor extends out, the rear frame driving motor drives the second rotating rods to rotate around the second pins relative to the second fixing rods, and the second rotating rods push the rear bed board assembly to be folded upward.

[0018] In the ultra-thin foldable bed frame, the rear bed board assembly includes a second fixed bed board, a second movable bed board, and a third movable bed board, the second movable bed board is rotatably connected to the second fixed bed board through hinges, and the third movable bed board is rotatably connected to the second movable bed board through hinges, so that when the rear frame driving motor extends out, the second rotating rods push the second movable bed board to be folded upward relative to the second fixed bed board.

[0019] In the ultra-thin foldable bed frame, the rear push rod assembly further includes a pair of foot support rods, and two ends of each foot support rod are respectively rotatably connected to the rear frame and the third movable bed board, so that when the second movable bed board is folded upward relative to the second fixed bed board, the third movable bed board is lifted upward by the second movable bed board and the foot support rods.

[0020] In the ultra-thin foldable bed frame, the second movable bed board is disposed above the second rotating rods, and the third movable bed board is disposed above the foot support rods.

[0021] In the ultra-thin foldable bed frame, a roller is disposed on each of the first rotating rods of the front push rod assembly, and the first rotating rods are configured for rolling contact with a bed board by using the rollers.

[0022] In the ultra-thin foldable bed frame, a roller is disposed on each of the second rotating rods of the rear push rod assembly, and the second rotating rods are configured for rolling contact with a bed board by using the rollers.

[0023] In the ultra-thin foldable bed frame, the front frame driving motor and the rear frame driving motor are linear motors.

[0024] In this way, not only the thickness of the foldable bed frame is minimized and overall reliability of the foldable bed frame is maximized, but also stable operation of the entire bed frame is realized by using the push rod assemblies by means of rolling contact between the push rod assemblies and the bed boards.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. **1** is a bottom view of a foldable bed frame according to an embodiment.

[0026] FIG. **2** is a schematic diagram of the foldable bed frame according to an embodiment in a folded state.

[0027] FIG. **3** is a schematic side view of the foldable bed frame according to an embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0028] The present invention is further illustrated by the following specific embodiment.

[0029] As shown in FIG. **1**, an ultra-thin foldable bed frame includes a front frame **1** and a rear frame **2** that are rotatably connected to each other, a front push rod assembly **3** and a rear push rod assembly **4** respectively disposed on the front frame **1** and the rear frame **2**, a front bed board assembly **5** and a rear bed board assembly **6** respectively laid on the front push rod assembly **3** and the rear push rod assembly **4**, a front frame driving motor **7**, and a rear frame driving motor **8**. The front push rod assembly **3** and the rear push rod assembly **4** are respectively connected to the front frame driving motor **7** and the rear frame driving motor **8**, and configured to respectively drive the front bed board assembly **5** and the rear bed board assembly **6** to be folded upward under driving of the front frame driving motor **7** and the rear frame driving motor **8**. Specifically, the front frame driving motor **7** and the rear frame driving motor **8** may be linear motors. When the front push rod assembly **3** and the rear push rod assembly **4** are at an initial position, the front frame **1**, the rear frame **2**, the push rod assemblies **3**, **4**, and the driving motors **7**, **8** all fall within a range of the thicknesses of the front frame **1** and the rear frame **2**. Therefore, the entire foldable bed frame can be directly landed by using the front frame **1** and the rear frame **2**. In this way, the foldable bed frame can be directly placed on the ground without bed legs.

[0030] In the ultra-thin foldable bed frame, as shown in FIG. **2**, the front frame **1** and the rear frame **2** are foldable inward by using intermediate links **9**, so that the front frame **1** and the rear frame **2** are prevented from colliding or interfering with each other during folding and storage. After the front frame **1** and the rear frame **2** are completely unfolded, a gap between the front frame **1** and the rear frame **2** is filled by using a cushion block **10** disposed on the front frame **1** or the rear frame **2**, so that the front frame **1** and the rear frame **2** are kept horizontally unfolded and free from downwarping.

[0031] Since the ultra-thin foldable bed frame has a very small thickness, there is no extra gap between the front frame **1** and the rear frame **2** and the front bed board assembly **5** and the rear bed board assembly **6**. During operation of the driving motors **7**, **8**, they will tilt upward. Therefore, a window **11** is provided on each of the bed board assemblies **5**, **6** to avoid interference between the driving motors **7**, **8** and the bed board assemblies **5**, **6** and minimize the thickness of the entire foldable bed frame.

[0032] As shown in FIG. **1** and FIG. **3**, in the ultra-thin foldable bed frame, the front push rod assembly **3** includes a pair of first rotating rods **31** and a pair of first fixing rods **32** respectively disposed on two sides of the front frame **1**, the first fixing rods **32** are fixedly connected to the front frame **1**, and the first rotating rods **31** are rotatably connected to the first fixing rods **32** through first pins **13**. The front push rod assembly **3** further includes a first transverse rod **33**, and two ends of the first transverse rod **33** are respectively fixedly connected to the first rotating rods **31**. A first connecting seat **14** is fixed on the front frame **1**, a second connecting seat **15** is fixed on the first transverse rod **33**, and two ends of the front frame driving motor **7** are respectively rotatably connected to the first connecting seat **14** and the second connecting seat **15**, so that when the front frame driving motor **7** extends out, the front frame driving motor **7** drives the first rotating rods **31** to rotate around the first pins **13** relative to the first fixing rods **32**, and the first rotating rods **31** push the front bed board assembly **5** to be

folded upward. Specifically, the first connecting seat **14** is disposed in the middle of the front frame **1**, and the second connecting seat **15** is disposed in the middle of the first transverse rod **33**.

[0033] Likewise, the rear push rod assembly **4** includes a pair of second rotating rods **41** and a pair of second fixing rods **42** respectively disposed on two sides of the rear frame **2**, the second fixing rods **42** are fixedly connected to the rear frame **2**, and the second rotating rods **41** are rotatably connected to the second fixing rods **42** through second pins **16**. The rear push rod assembly **4** further includes a second transverse rod **43**, and two ends of the second transverse rod **43** are respectively fixedly connected to the second rotating rods **41**. A third connecting seat **17** is fixed on the rear frame **2**, a fourth connecting seat **18** is fixed on the second transverse rod **43**, and two ends of the rear frame driving motor **8** are respectively rotatably connected to the third connecting seat **17** and the fourth connecting seat **18**, so that when the rear frame driving motor **8** extends out, the rear frame driving motor **8** drives the second rotating rods **41** to rotate around the second pins **16** relative to the second fixing rods **42**, and the second rotating rods **41** push the rear bed board assembly **6** to be folded upward. Specifically, the third connecting seat **17** is disposed in the middle of the rear frame **2**, and the fourth connecting seat **18** is disposed in the middle of the second transverse rod **43**.

[0034] In the ultra-thin foldable bed frame, the front bed board assembly **5** includes a first fixed bed board **51** and a first movable bed board **52**, and the first movable bed board **52** is rotatably connected to the first fixed bed board **51** through hinges **12**, so that when the front frame driving motor **7** extends out, the first rotating rods **31** push the first movable bed board **52** to be folded upward relative to the first fixed bed board **51**.

[0035] In the ultra-thin foldable bed frame, the rear bed board assembly **6** includes a second fixed bed board **61**, a second movable bed board **62**, and a third movable bed board **63**. The second movable bed board **62** is rotatably connected to the second fixed bed board **61** through hinges **12**, and the third movable bed board **63** is rotatably connected to the second movable bed board **62** through hinges **12**, so that when the rear frame driving motor **8** extends out, the second rotating rods **41** push the second movable bed board **62** to be folded upward relative to the second fixed bed board **61**.

[0036] The rear push rod assembly **4** further includes a pair of foot support rods **44**, and two ends of each foot support rod **44** are respectively rotatably connected to the rear frame **2** and the third movable bed board **63**, so that when the second movable bed board **62** is folded upward relative to the second fixed bed board **61**, the third movable bed board **63** is lifted upward by the second movable bed board **62** and the foot support rods **44**.

[0037] Further, a roller **19** is disposed on each of the first rotating rods **31** of the front push rod assembly **3** and on each of the second rotating rods **41** of the rear push rod assembly **4**, the first rotating rods **31** are configured for rolling contact with a bed board (i.e., the first movable bed board **52**) by using the rollers **19**, and the second rotating rods **41** are configured for rolling contact with a bed board (i.e., the second movable bed board **62**) by using the rollers **19**. Specifically, in this embodiment, there are two rollers disposed on each of the first rotating rods **31**, and there is only one roller disposed on each of the second rotating rods **41**. In addition, in order to enhance comfort, the rear bed board assembly **6** is divided into a leg bed board (i.e., the second movable bed board **62**) and a foot bed board (i.e., the third movable bed board **63**). The leg bed board (i.e., the second movable bed board **62**) is disposed above the second rotating rods **41**, and the foot bed board (i.e., the third movable bed board **63**) is disposed above the foot support rods **44**.

[0038] As shown in this embodiment, in the foldable bed frame structure, when the front frame **1** and the rear frame **2** are unfolded flat, all movable components do not exceed the thicknesses of the front frame **1** and the rear frame **2**, so that the entire foldable bed frame can be directly landed by using the front frame **1** and the rear frame **2**. In this way, the foldable bed frame can be directly placed on the ground without bed legs. On this basis, stable operation of the entire foldable bed frame is realized by using the push rod assemblies **3**, **4** by means of rolling contact between the push rod assemblies **3**, **4** and the bed boards.

What is claimed is:

1. An ultra-thin foldable bed frame, comprising a front frame and a rear frame that are rotatably connected to each other, a front push rod assembly and a rear push rod assembly respectively disposed on the front frame and the rear frame, a front bed board assembly and a rear bed board assembly respectively laid on the front push rod assembly and the rear push rod assembly, and a driving motor, wherein the front push rod assembly and the rear push rod assembly are connected to the driving motor and configured to drive the bed board assemblies to be folded upward under driving of the driving motor; and when the driving motor is at an initial position, the front frame, the rear frame, the push rod assemblies, and the driving motor all fall within a range of the thicknesses of the front frame and the rear frame.

2. The ultra-thin foldable bed frame according to claim **1**, wherein the driving motor comprises a front frame driving motor and a rear frame driving motor, and the two driving motors are respectively disposed in the front frame and the rear frame and configured to drive the front push rod assembly and the rear push rod assembly to move.

3. The ultra-thin foldable bed frame according to claim **1**, further comprising two intermediate links, wherein the two intermediate links rotatably connect the front frame to the rear frame on two sides, so that the front frame and the rear frame are foldable inward by using the intermediate links.

4. The ultra-thin foldable bed frame according to claim **1**, further comprising a cushion block disposed on the front frame or the rear frame, wherein when the front frame and the rear frame are unfolded, a gap between the front frame and the rear frame is filled by using the cushion block, so that the front frame and the rear frame are kept horizontally unfolded and free from downwarping.

5. The ultra-thin foldable bed frame according to claim **1**, wherein a window is provided on each of the front bed board assembly and the rear bed board assembly to avoid interference between the driving motor and the bed board assemblies.

6. The ultra-thin foldable bed frame according to claim **1**, wherein the front push rod assembly comprises a pair of first rotating rods and a pair of first fixing rods respectively disposed on two sides of the front frame, the first fixing rods are fixedly connected to the front frame, and the first rotating rods are rotatably connected to the first fixing rods through first pins, the front push rod assembly further comprises a first transverse rod, and two ends of the first transverse rod

are respectively fixedly connected to the first rotating rods, a first connecting seat is fixed on the front frame, a second connecting seat is fixed on the first transverse rod, and two ends of the front frame driving motor are respectively rotatably connected to the first connecting seat and the second connecting seat, so that when the front frame driving motor extends out, the front frame driving motor drives the first rotating rods to rotate around the first pins relative to the first fixing rods, and the first rotating rods push the front bed board assembly to be folded upward.

7. The ultra-thin foldable bed frame according to claim **6**, wherein the front bed board assembly comprises a first fixed bed board and a first movable bed board, and the first movable bed board is rotatably connected to the first fixed bed board through hinges, so that when the front frame driving motor extends out, the first rotating rods push the first movable bed board to be folded upward relative to the first fixed bed board.

8. The ultra-thin foldable bed frame according to claim **1**, wherein the rear push rod assembly comprises a pair of second rotating rods and a pair of second fixing rods respectively disposed on two sides of the rear frame, the second fixing rods are fixedly connected to the rear frame, and the second rotating rods are rotatably connected to the second fixing rods through second pins, the rear push rod assembly further comprises a second transverse rod, and two ends of the second transverse rod are respectively fixedly connected to the second rotating rods, a third connecting seat is fixed on the rear frame, a fourth connecting seat is fixed on the second transverse rod, and two ends of the rear frame driving motor are respectively rotatably connected to the third connecting seat and the fourth connecting seat, so that when the rear frame driving motor extends out, the rear frame driving motor drives the second rotating rods to rotate around the second pins relative to the second fixing rods, and the second rotating rods push the rear bed board assembly to be folded upward.

9. The ultra-thin foldable bed frame according to claim **8**, wherein the rear bed board assembly comprises a second fixed bed board, a second movable bed board, and a third movable bed board, the second movable bed board is rotatably connected to the second fixed bed board through hinges, and the third movable bed board is rotatably connected to the second movable bed board through hinges, so that when the rear frame driving motor extends out, the second rotating rods push the second movable bed board to be folded upward relative to the second fixed bed board.

10. The ultra-thin foldable bed frame according to claim **9**, wherein the rear push rod assembly further comprises a pair of foot support rods, and two ends of each foot support rod are respectively rotatably connected to the rear frame and the third movable bed board, so that when the second movable bed board is folded upward relative to the second fixed bed board, the third movable bed board is lifted upward by the second movable bed board and the foot support rods.

11. The ultra-thin foldable bed frame according to claim **10**, wherein the second movable bed board is disposed above the second rotating rods, and the third movable bed board is disposed above the foot support rods.

12. The ultra-thin foldable bed frame according to claim **6**, wherein a roller is disposed on each of the first rotating rods of the front push rod assembly, and the first rotating rods are configured for rolling contact with a bed board by using the rollers.

13. The ultra-thin foldable bed frame according to claim **8**, wherein a roller is disposed on each of the second rotating rods of the rear push rod assembly, and the second rotating rods are configured for rolling contact with a bed board by using the rollers.

14. The ultra-thin foldable bed frame according to claim **2**, wherein the front frame driving motor and the rear frame driving motor are linear motors.

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