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(71) Applicant: **Remacro Technology Co., Ltd.**
Suzhou City, Jiangsu 215200 (CN)

(72) Inventors:
- **Cai, Saijun**
  Suzhou City, Jiangsu, 215200 (CN)
- **Li, Xiaohong**
  Suzhou City, Jiangsu 215200 (CN)
- **Song, Gang**
  Suzhou City, Jiangsu 215200 (CN)
- **Lv, Zhanzheng**
  Suzhou City, Jiangsu 215200 (CN)

(74) Representative: **Petraz, Gilberto Luigi et al**
GLP S.r.l.
Viale Europa Unita, 171
33100 Udine (IT)

(54) MECHANICAL STRETCHING DEVICE FOR MOVABLE SEAT UNIT AND SEAT UNIT

(57) The present disclosure relates to a mechanical stretching device for movable seat unit, in which the mechanical stretching device includes: a seat support, arranged to attach to a seat; a leg stretching device, pivoted at a front part of the seat support; a backrest support, pivoted at a rear part of the seat support; and an electrically actuated unit, including a leg electrically actuated device for folding and unfolding of the leg stretching device and a backrest electrically actuated device for backward reclining or forward resetting of the backrest support. Furthermore, the present disclosure further relates to a movable seat unit.

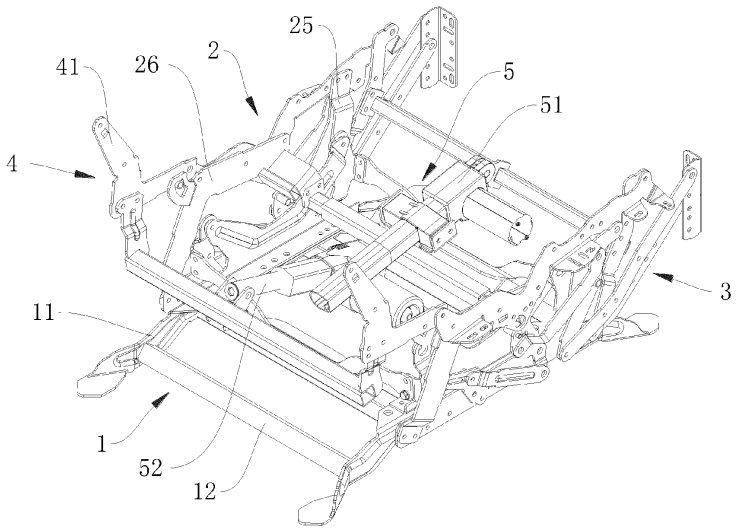

Fig. 1

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Description

Field

[0001] The present disclosure relates to a mechanical stretching device for movable seat unit and a seat unit including the same.

Background

[0002] A variety of seating units for movable seat devices, such as rocking chairs, swinging chairs, and sofas having a rocking function, are well known in the prior art. The seat unit typically has a base assembly, a seat assembly, a backrest assembly, and a leg extension device. The seat unit is capable of switching between two or three of a sitting position, a relaxing position and a lying position. The known seat units often employ a single-motor type electrically actuated unit acting between the backrest assembly and the leg stretching device to achieve multiple position changes of the seat unit. However, the disadvantages of the design are that, on the one hand, the mechanical stretching device has a large number of parts and complex connection relationships, which require high manufacturing and assembly processes, and on the other hand, the electrically actuated unit is arranged between the backrest assembly and the leg stretching device, which is also responsible for the position change of the two assemblies, so that undesired situations, such as stagnation, may occur in the working stroke of the electrically actuated unit.

Summary

[0003] The technical problem to be solved in the present disclosure is to provide a seat unit of simpler structure, easier operation and lower manufacturing cost.

[0004] In the present disclosure, the "front-back direction" is in terms of an extension direction of the leg stretching device of the seat unit or the mechanical stretching device, and specifically, the "front" refers to a direction facing the leg stretching device, and the "back" refers to a direction facing the backrest.

[0005] In order to solve the aforementioned technical problems, provided in the present disclosure is a mechanical stretching device for movable seat unit, in which the mechanical stretching device includes: a seat support, arranged to attach to a seat; a leg stretching device, pivoted at a front part of the seat support; a backrest support, pivoted at a rear part of the seat support; and an electrically actuated unit, including a leg electrically actuated device for folding and unfolding of the leg stretching device and a backrest electrically actuated device for backward reclining or forward resetting of the backrest support.

[0006] In accordance with the present disclosure, the mechanical stretching device is directly switched at least between a sitting position and a lying position, the leg stretching device is folded below the seat support in the sitting position, the leg stretching device is lifted forwards and upwards and the backrest support is reclining backwards in the lying position, stretching of the leg stretching device and backward reclining of the backrest support are performed simultaneously through the electrically actuated unit when the mechanical stretching device is switched from the sitting position to the lying position, and unfolding of the leg stretching device and forward resetting of the backrest support are performed simultaneously when the mechanical stretching device is switched from the lying position to the sitting position.

[0007] In a preferable implementation, the mechanical stretching device is directly switched between the sitting position and a relaxing position, when in the relaxing position, the leg stretching device is lifted forwards and upwards, and a relative position between the backrest support and the seat support is kept to be the same in the sitting position.

[0008] In a preferable implementation, the mechanical stretching device is sequentially switched from the sitting position to the lying position and then to the relaxing position by means of the electrically actuated unit.

[0009] Separate controls for the leg stretching device and the backrest assembly are achieved by means of the electrically actuated unit, in which the leg electrically actuated device only controls the folding and unfolding of the leg stretching device, and the backrest electrically actuated device only controls the backward reclining and forward resetting of the backrest support. By means of the cooperation between the leg electrically actuated device and the backrest electrically actuated device, the backrest assembly or, specifically, the backrest support is unable to reclined backwards when the leg stretching device is not carried out an unfolding. In such an arrangement, a variety of operating modes of the mechanical stretching device are achieved. In an operating mode, the mechanical stretching device is directly switched from the sitting position to the lying position; in a second operating mode, the mechanical stretching device is switched from the lying position to the relaxing position; in a third operating mode, the mechanical stretching device is switched from the sitting position to the relaxing position; in a fourth operating mode, the mechanical stretching device is switched from the relaxing position to the sitting position; and in a fifth operating mode, the mechanical stretching device is directly reset from any intermediate position between the sitting position and the lying position to the sitting position.

[0010] In a preferable implementation, the leg electrically actuated device acts between the leg stretching device and the seat support, and the backrest electrically actuated device acts between the backrest support and the seat support.

[0011] Further and preferably, a leg crossbar is rigidly connected to the leg stretching device, a seat crossbar is rigidly connected to the seat support, an end of the leg electrically actuated device is pivoted to the leg crossbar,

an opposite end of the leg electrically actuated device is pivoted to the seat crossbar, and the leg electrically actuated device drives the leg crossbar to move away from or close to the seat crossbar, so that the leg stretching device is unfolded or folded.

[0012] Further and preferably, a backrest crossbar is rigidly connected to the backrest support, an end of the backrest electrically actuated device is pivoted to the backrest crossbar, an opposite end of the backrest electrically actuated device is pivoted to the seat crossbar, the backrest electrically actuated device drives the backrest crossbar to move away from or close to the seat crossbar, so that the backrest support is reclined backwards or reset forwards.

[0013] In a preferable implementation, at least one of the leg electrically actuated device and the backrest electrically actuated device is a linear electric actuator. Preferably, the linear electric actuator may be a pusher motor or a slider motor.

[0014] In a preferable implementation, the mechanical stretching device further includes a base assembly for supporting the mechanical stretching device on the ground, the seat support is connected to the base assembly by means of a link mechanism, so as to swing in a front-back direction of the seat unit with respect to the base assembly.

[0015] Further and preferably, the link mechanism includes a swing base plate, a front swing rod, a back swing rod and a transmission connecting rod, respective upper end of both the front swing rod and back swing rod is pivoted to the swing base plate, respective lower end of both the front swing rod and back swing rod is pivoted to the transmission connecting rod, the swing base plate is fixedly connected to the base assembly, and the transmission connecting rod is connected to the seat support.

[0016] Further and preferably, the mechanical stretching device further includes a swing limit mechanism, in which the swing limit mechanism allows the seat support to swing with respect to the base assembly in the sitting position of the mechanical stretching device, and the swing limit mechanism prevents the seat support from swinging with respect to the base assembly in the relaxing position or the lying position of the mechanical stretching device.

[0017] Accordingly, the seat of the seat unit is prevented from swinging back and forth with respect to the base assembly when the leg stretching device is unfolded, which improves the safety of use.

[0018] Additionally, in order to solve the technical problem, provided in the present disclosure is further a movable seat unit, including: a seat, a backrest, a footrest member, and a mechanical stretching device, in which the mechanical stretching device includes: a seat support, arranged to attach to a seat; a leg stretching device, arranged to attach to the footrest, pivoted to a front part of the seat support; a backrest support, arranged to attach to the backrest, pivoted to a rear part of the seat support; and an electrically actuated unit, including a leg electrically actuated device for folding and unfolding of the leg stretching device and a backrest electrically actuated device for backward reclining or forward resetting of the backrest support, in which the seat unit is directly switched at least between a sitting position and a lying position, the leg stretching device is folded below the seat support in the sitting position, the footrest member is lifted forwards and upwards and the backrest is reclining backwards in the lying position, lifting up of the footrest member and backward reclining of the backrest are performed simultaneously through the electrically actuated unit when the seat unit is switched from the sitting position to the lying position, and recovery of the footrest member and forward resetting of the backrest are performed simultaneously by means of the electrically actuated unit when the seat unit is switched from the lying position to the sitting position.

[0019] In a preferable implementation, the seat unit is directly switched between the sitting position and a relaxing position, when in the relaxing position, the footrest member is lifted forwards and upwards, and a relative position between the backrest and the seat is kept to be the same in the sitting position.

[0020] In a preferable implementation, the seat unit is sequentially switched from the sitting position to the lying position and then to the relaxing position by means of the electrically actuated unit.

[0021] In a preferable implementation, the leg electrically actuated device acts between the leg stretching device and the seat support, and the backrest electrically actuated device acts between the backrest support and the seat support.

[0022] Further and preferably, a leg crossbar is rigidly connected to the leg stretching device, a seat crossbar is rigidly connected to the seat support, an end of the leg electrically actuated device is pivoted to the leg crossbar, an opposite end of the leg electrically actuated device is pivoted to the seat crossbar, and the leg electrically actuated device drives the leg crossbar to move away from or close to the seat crossbar, so that the leg stretching device is unfolded or folded.

[0023] Further and preferably, a backrest crossbar is rigidly connected to the backrest support, an end of the backrest electrically actuated device is pivoted to the backrest crossbar, an opposite end of the backrest electrically actuated device is pivoted to the seat crossbar, the backrest electrically actuated device drives the backrest crossbar to move away from or close to the seat crossbar, so that the backrest support is reclined backwards or reset forwards.

[0024] In a preferable implementation, at least one of the leg electrically actuated device and the backrest electrically actuated device is a linear electric actuator.

[0025] In a preferable implementation, a base assembly for supporting the mechanical stretching device on the ground, the seat support is connected to the base assembly by means of a link mechanism, so as to swing in a front-back direction of the seat unit with respect to the

base assembly.

[0026] Further and preferably, the link mechanism includes a swing base plate, a front swing rod, a back swing rod and a transmission connecting rod, respective upper end of both the front swing rod and back swing rod is pivoted to the swing base plate, respective lower end of both the front swing rod and back swing rod is pivoted to the transmission connecting rod, the swing base plate is fixedly connected to the base assembly, and the transmission connecting rod is connected to the seat support.

[0027] Further and preferably, the mechanical stretching device further includes a swing limit mechanism, in which the swing limit mechanism allows the seat support to swing with respect to the base assembly in the sitting position of the seat unit, and the swing limit mechanism prevents the seat support from swinging with respect to the base assembly in the relaxing position or the lying position of the seat unit.

Brief description of the drawings

[0028] The following embodiments of the present disclosure are specifically described by means of the accompanying drawings.

Fig. 1 schematically shows a perspective view of a mechanical stretching device according to an embodiment of the present disclosure in a sitting position;
Fig. 2 schematically shows a perspective view of the mechanical stretching device of Fig. 1 in a relaxing position;
Fig. 3 schematically shows a perspective view of the mechanical stretching device of Fig. 1 in a lying position;
Fig. 4 schematically shows a partially enlarged view of the mechanical stretching device of Fig. 1.
Fig. 5 schematically shows a side view of the mechanical stretching device of Fig. 1 in a sitting position;
Fig. 6 schematically shows a side view of the mechanical stretching device of Fig. 1 in a relaxing position;
Fig. 7 schematically shows a side view of the mechanical stretching device of Fig. 1 in a lying position.

Detailed description of the embodiments

[0029] It is shown exemplarily, according to Figs. 1-3, a perspective view of an embodiment of a mechanical stretching device for a movable seat unit. The mechanical stretching device includes a base assembly 1, seat assemblies 2 supported above the base assembly 1 and provided in a mirrored symmetrical arrangement, a leg stretching device 3, and backrest assembly 4. Additionally, the mechanical stretching device further includes an electrically actuated unit 5.

[0030] As shown in Fig. 1, the base assembly 1 includes two longitudinal supports 11 extending in parallel to the front-back direction of the mechanical stretching device and two transverse supports 12 connecting between the longitudinal supports 11. The longitudinal supports 11 and the transverse supports 12 constitute a frame structure collectively to movably support the mechanical stretching device on the ground.

[0031] In an implementation not shown, the base assembly may also be constructed as a circular support supported on the ground, in which a fixing support constituted by a set of parallel extended support rods is rotatably connected on the circular support, and the fixing support is arranged to movably support the mechanical stretching device above the ground.

[0032] The seat assembly 2 includes a seat support 21 arranged to attach to a seat, and a swing base plate 22 on the longitudinal support 11 fixedly attached to the base assembly 1, in which the seat support 21 is movably connected to the base assembly through a link mechanism. Specifically, the seat support 21 may swing with respect to a front-back direction of the base assembly 1. The link mechanism includes the swing base plate 22, a front swing rod 23, a back swing rod 24, and a transmission connecting rod 25. A bottom of the swing base plate 22 is fixedly connected to the longitudinal support 11, a front end of a top of the swing base plate 22 is pivoted to the a top end of the front swing rod 23, a back end of a top of the swing base plate 22 is pivoted to a top end of the back swing rod 24, a lower end of the front swing rod 23 and a lower end of the back swing rod 24 are pivoted to the longitudinally extended transmission connecting rod 25 respectively, a front end of the transmission connecting rod 25 is extended upwards and is fixedly connected to a front end of the seat support 21, and an additional connecting rod 26 is fixedly connected between a back end of the transmission connecting rod 25 and the seat support 21. In such an arrangement, the front swing rod 23 and the back swing rod 24 swing around their respective pivot points with the swing base plate 22, which drives the transmission connecting rod 25 and the seat support 21 to swing with respect to a front-back direction of the base assembly 1.

[0033] As shown in Fig. 2, the leg stretching device 3 is constituted by a plurality of links pivoted at each other, which includes a first leg link 31, a second leg link 32, a third leg link 33, a fourth leg link 34, and a footrest mounting plate 35 arranged to attach to the footrest member. A back end of the third leg link 33 is pivoted to the seat support 21, a front end of the third leg link 33 is pivoted to a back end of the second leg link 32, a back end of the fourth leg link 34 is pivoted to a front end of the seat support 21, a front end of the fourth leg link 34 is pivoted to a back end of the first leg link 31, front ends of the first leg link 31 and the second leg link 32 are pivoted to the footrest mounting plates 35 respectively, and respective middle parts of the second leg link 32 and the fourth leg link 34 are pivoted to each other. In the present implementation, the pivot point between the fourth leg link 34 and the seat support 21 is positioned further forward than

the pivot point between the third leg link 33 and the seat support 21.

[0034] The backrest assembly 4 includes a backrest support 41 pivoted to the seat support 21. The seat support 41 is constructed with a horizontal segment 41a extending substantially horizontally and a vertical segment 41b extending substantially vertically in the sitting position. In the present implementation, a forward-directed free end of the horizontal segment 41a of the backrest support 41 is pivoted to the seat support 21 at the backrest pivot point 45. Additionally, a backrest crossbar 44 is provided between backrest supports 41 on the left and right sides, and the backrest crossbar 44 is fixedly connected to a transition part between the horizontal segment 41a and the vertical segment 41b of the backrest support 41 by means of the backrest connecting member 43.

[0035] The mechanical stretching device includes an electrically actuated unit 5, including a leg electrically actuated device 51 for folding and unfolding of the leg stretching device 3 and a backrest electrically actuated device 52 for backward reclining or forward resetting of the backrest support 41. The leg electrically actuated device 51 acts between the leg stretching device 3 and the seat support 2, and the backrest electrically actuated device 52 acts between the backrest assembly 4 and the seat support 2.

[0036] The electrically actuated unit 5 is constructed as a linear motor, and the leg electrically actuated device 51 and the backrest electrically actuated device 52 both have a motor head and an actuated part that is displaceable with respect to the motor head, so as to achieve a change in the position of the leg stretching device and the backrest support by means of a change in the distance between the motor head and the corresponding actuated part. In the present implementation, the leg electrically actuated device 51 is designed as a slider motor, and the backrest electrically actuated device 52 is designed as a pusher motor. Alternatively, in an implementation not shown, the backrest electrically actuated device 52 may also be designed as a slider motor, and the leg electrically actuated device may be designed as a pusher motor, or both of them are designed as slider motors or pusher motor, which is not limited herein.

[0037] As shown in Fig. 3 and Fig. 4, a leg crossbar 36 is provided between leg stretching devices 3, and a seat crossbar 27 is provided between seat supports 21, in which respective ends of the seat crossbar 27 are fixedly connected to a bent segment of the additional connecting rod 26, and the additional connecting rod 26 is fixedly connected to the seat support 21. The leg electrically actuated device 51 constructed as a slider motor includes a leg motor head 51a, a motor sliding rail 51b connected to the leg motor head 51a, and a motor slider that is slidable with respect to the motor sliding rail 51b, in which the leg motor head 51a is pivoted to the leg crossbar 36 fixedly connected to the fourth leg link 34, and the motor slider 73 is pivoted to the seat crossbar 27. Therefore, when the leg motor head 51a is moving back and forth with respect to the motor slider 51c along the motor sliding rail 51b, the leg crossbar 36 drives the leg stretching device 3 to unfold forwards or fold backwards by means of the fourth leg link 34.

[0038] The backrest electrically actuated device 52 constructed as a pusher motor includes a backrest motor head 52a and a motor pusher 52b retractable with respect to the backrest motor head 52a, in which the backrest motor head 52a is pivoted to the seat crossbar 27, and the free end of the motor pusher 52b is pivoted to the backrest crossbar 44. Therefore, when the motor pusher 52b is extended or retrated with respect to the backrest motor head 52a, the backrest crossbar 44 drives the backrest support 41 to rotate around the backrest pivot point 45.

[0039] In a preferable implementation, as shown in Fig. 4, a limit protrusion 42 is provided on the backrest support 41, and the limit protrusion 42 may be cooperated with the limit slot 28 provided on the seat assembly 1 to restrict the rotation of the backrest support 41. In the present implementation, a connecting plate protruding facing the backrest assembly 4 is formed on the additional connecting rod 26 fixedly connected to the seat support 21, and the limit slot 28 is provided in the connecting plate. The limit slot 28 is extended radially, and the limit protrusion 42 is slidably embedded into the limit slot 28. When the backrest support 41 is rotated backwards with respect to the seat support 21 at the backrest pivot point 45, the limit protrusion 42 slides downwards along the limit slot 28 until the limit protrusion 42 is abutted against a lower end of the limit slot 28, which accordingly achieve the limit position of the backward reclining of the backrest support 41.

[0040] In a preferable implementation, as shown in Figs. 5-7, the mechanical stretching device includes a swing limit mechanism 6, in which the swing limit mechanism 6 includes a first limit member 61, a second limit member 63, a slide slot limit member 64, and a limit driven rod 66. A middle of the first limit member 61 is pivoted to the transmission connecting rod 25, an upper end of the first limit member 61 is provided with a first limit bushing 62 (as shown in Fig. 4), a lower end of the first limit member 61 is pivoted to a front end of the second limit member 63, and a back end of the second limit member 63 is provided with a second limit bushing (not shown in the figures). The slide slot limit member 64 is fixedly connected to the transmission connecting rod 25 and is extended upwards from the transmission connecting rod 25 to form a segment with a swing limit slide slot 65, and the second limit bushing may be movably embedded into the swing limit slide slot 65. An end of the limit driven rod 66 is pivoted to an upper part of the first limit member 61, and an opposite end of the limit driven rod 66 is pivoted to the leg stretching device 3, which is pivoted to the third leg link 33 specifically in the present implementation.

[0041] The swing limit mechanism 6 may be switched

between a swing release state and a swing limit state. In the swing release state as shown in Fig. 5, the mechanical stretching device is in the sitting position, in which both the first limit bushing 62 and the second limit bushing are not in contact with both the front swing rod 23 and the back swing rod 24, so as to allow the front swing rod 23 and the back swing rod 24 to be rotated back and forth, so that the seat support 21 may swing back and forth with respect to the base assembly 1. With the leg stretching device 3 unfolding, the third leg link 33 is stretched forward to drive the limit driven rod 66 to move forward, so that the first limit member 61 is rotated in a clockwise direction as shown in Fig. 6 and Fig. 7. In such an arrangement, the first limit bushing 62 and the second limit bushing moves in opposite directions respectively, in which the first limit bushing 62 moves forward facing the front swing rod 23, and the second limit bushing in the swing limit slide slot 65 moves backwards facing the back swing rod 24. When the leg stretching device 3 of the mechanical stretching device is fully unfolded, as the relaxing position shown in the Fig. 6 or the lying position shown in the Fig. 7, the first limit bushing 62 is abutted against an interior side of the front swing rod 23, and the second limit bushing is abutted against an interior side of the back swing rod 24, so as to prevent the rotation of the front swing rod 23 and the back swing rod 24, so that the seat support 21 is unable to swing back and forth with respect to the base assembly 1.

[0042] Hereinafter, with reference to Figs. 1-7, the operating mode of the seat unit for changing between the sitting position, the relax position, and the lying position is illustrated.

[0043] In the sitting position shown in the Fig. 1 and Fig. 5, the backrest support is upright, and the leg stretching device 3 is fully folded below the seat support 21. The leg electrically actuated device 51 and the backrest electrically actuated device 52 are in their initial state respectively, in which a distance between the leg motor head 51a and the motor slider 51c of the leg electrically actuated device 51 is at a minimum, and a distance between the backrest motor head 52a and the motor pusher 52b of the backrest electrically actuated device 52 is at a maximum, i.e., the motor pusher 52b is pushed with respect to the backrest motor head 52a.

[0044] In the relaxing position shown in the Fig. 2 and Fig. 6, a relative position between the backrest support 41 and the seat support 21 is kept substantially unchanged as that in the sitting position, and the leg stretching device 3 is fully unfolded forwards. The leg motor head 51a of the leg electrically actuated device 51 moves forwards with respect to the motor slider 51c along the motor sliding rail 51b, so that the distance between the leg motor head 51a and the motor slider 51c is increased, so as to allow the leg crossbar 36 to drive the fourth leg link 34 to be extended forwards and lifted upwards, thereby allowing the leg stretching device 3 to be unfolded from a folding state in the sitting position.

[0045] In the lying position shown in Fig. 3 and Fig. 7, the leg stretching device 3 is in a fully stretched state, and the backrest support 41 is backwards reclined. The motor pusher 52b of the backrest electrically actuated device 52 is retracted facing the backrest motor head 52a, so that the backrest crossbar 44 is pulled forwards, so as to drive the backrest support 41 to be backwards rotated with respect to the seat support 21 at the backrest pivot point 45.

[0046] In an implementation of the present disclosure, the electrically actuated unit 5 is configured with a control module, in which the control module enables the position switching of the mechanical stretching device between multiple operating mode, and the operating mode is selected from a first operating mode, a second operating mode, a third operating mode, a fourth operating mode, and a fifth operating mode.

[0047] In the first operating mode, the mechanical stretching device is directly switched from the sitting position to the lying position. During this process, both the leg electrically actuated device 51 and the backrest electrically actuated device 52 work simultaneously from their respective initial state, in which the leg motor head 51a move away from the motor slider 51c, and the motor pusher 52b is retracted with respect to the backrest motor head 52a, so that the unfolding of the leg stretching device 3 and the backward reclining of the backrest support 41 are performed simultaneously. In such an arrangement, the mechanical stretching device is directly switched from the sitting position to the lying position.

[0048] In the second operating mode, the mechanical stretching device is switched from the lying position to the relaxing position. During this process, the leg motor head 51a of the leg electrically actuated device 51 is kept away from the motor slider 51c, and only the motor pusher 52b of the backrest electrically actuated device 52 are pushed with respect to the backrest motor head 52a until the backrest electrically actuated device 52 is reset to the initial state. During this process, the backrest support 41 is rotated around the backrest pivot point 45 in a clockwise direction to forwardly reset from a backward reclining position, so that the mechanical stretching device is switched from the lying position to the relaxing position.

[0049] In the third operating mode, the mechanical stretching device is directly switched from the sitting position to the relaxing position. During this process, only the leg electrically actuated device 51 works from the initial state, and the backrest electrically actuated device 52 is kept unchanged to maintain the initial state. The leg motor head 51a moves away from the motor slider 51c, so that the leg stretching device 3 is unfolded, so as to achieve that the mechanical stretching device is switched from the sitting position to the relaxing position.

[0050] The fourth operating mode is reversed from the third operating mode. In the fourth operating mode, the mechanical stretching device is switched from the relaxing position to the sitting position. Only the leg motor head 51a of the leg electrically actuated device 51 moves close to the motor slider 51c, so that the leg stretching device 3

is folded, so as to achieve that the mechanical stretching device is switched from the relaxing position to the sitting position.

[0051] In the fifth operating mode, the mechanical stretching device is directly reset from any position to the sitting position. In this process, both the leg electrically actuated device 51 and the backrest electrically actuated device 52 is switched to their respective initial state simultaneously, in which the leg motor head 51a moves closer to the motor slider 51c, and the motor pusher 52b is pushed with respect to the backrest motor head 52a, so that the folding of the leg stretching device 3 and the forward resetting of the backrest support 41 are performed simultaneously, so as to achieve that the mechanical stretching device is able to directly reset from any position (including positions between the sitting position and the relaxing position, any intermediate positions between the relaxing position and the lying position, or lying position) to the sitting position.

[0052] Consequently, different seat attitude changes may be achieved by the individual implementation of the operating modes individually or in reasonable combination. For example, when the first operating mode is combined with the second operating mode, the mechanical stretching device is capable of sequentially switching from the sitting position to the relaxing position and to the lying position. When the first operating mode is combined with the fifth operating position, the mechanical stretching device enables a one-touch transformation and a one-touch reset of the mechanical stretching device between the sitting position and the lying position.

List of attached labels

[0053]

1 base assembly
11 longitudinal support
12 transverse support
2 seat assembly
21 seat support
22 swing base plate
23 front swing rod
24 back swing rod
25 transmission connecting rod
26 additional connecting rod
27 seat crossbar
28 limit slot
3 leg stretching device
31 first leg link
32 second leg link
33 third leg link
34 fourth leg link
35 footrest mounting plate
36 leg crossbar
4 backrest assembly
41 backrest support
41a horizontal segment
41b vertical segment
42 limit protrusion
43 backrest connecting member
44 backrest crossbar
45 backrest pivot point
5 electrically actuated unit
51 leg electrically actuated device
51a leg motor head
51b motor sliding rail
51c motor slider
52 backrest electrically actuated device
52a backrest motor head
52b motor pusher
6 swing limit mechanism
61 first limit member
62 first limit bushing
63 second limit member
64 slide slot limit member
65 swing limit slide slot
66 limit driven rod

Claims

1. A mechanical stretching device for movable seat unit, comprising:

- a seat support (21), arranged to attach to a seat;
- a leg stretching device (3), pivoted at a front part of the seat support (21);
- a backrest support (41), pivoted at a rear part of the seat support (21); and
- an electrically actuated unit (5), comprising a leg electrically actuated device (51) for folding and unfolding of the leg stretching device (3) and a backrest electrically actuated device (52) for backward reclining or forward resetting of the backrest support (41), wherein the mechanical stretching device is directly switched at least between a sitting position and a lying position, the leg stretching device (3) is folded below the seat support (21) in the sitting position, the leg stretching device (3) is lifted forwards and upwards and the backrest support (41) is reclining backwards in the lying position, stretching of the leg stretching device (3) and backward reclining of the backrest support (41) are performed simultaneously through the electrically actuated unit (5) when the mechanical stretching device is switched from the sitting position to the lying position, and unfolding of the leg stretching device (3) and forward resetting of the backrest support (41) are performed simultaneously when the mechanical stretching device is switched from the lying position to the sitting position.

2. The mechanical stretching device according to claim 1, wherein the mechanical stretching device is directly switched between the sitting position and a relaxing position, when in the relaxing position, the leg stretching device (3) is lifted forwards and upwards, and a relative position between the backrest support (41) and the seat support (21) is kept to be the same in the sitting position.

3. The mechanical stretching device according to claim 2, wherein the mechanical stretching device is sequentially switched from the sitting position to the lying position and then to the relaxing position by means of the electrically actuated unit (5).

4. The mechanical stretching device according to any one of claims 1-3, wherein the leg electrically actuated device (51) acts between the leg stretching device (3) and the seat support (21), and the backrest electrically actuated device (52) acts between the backrest support (41) and the seat support (21).

5. The mechanical stretching device according to claim 4, wherein a leg crossbar (36) is rigidly connected to the leg stretching device (3), a seat crossbar (27) is rigidly connected to the seat support (21), an end of the leg electrically actuated device (51) is pivoted to the leg crossbar (36), an opposite end of the leg electrically actuated device (51) is pivoted to the seat crossbar (27), and the leg electrically actuated device (51) drives the leg crossbar (36) to move away from or close to the seat crossbar (27), so that the leg stretching device (3) is unfolded or folded.

6. The mechanical stretching device according to claim 5, wherein a backrest crossbar (44) is rigidly connected to the backrest support (41), an end of the backrest electrically actuated device (52) is pivoted to the backrest crossbar (44), an opposite end of the backrest electrically actuated device (52) is pivoted to the seat crossbar (27), the backrest electrically actuated device (52) drives the backrest crossbar (44) to move away from or close to the seat crossbar (27), so that the backrest support (41) is reclined backwards or reset forwards.

7. The mechanical stretching device according to claim 1, wherein at least one of the leg electrically actuated device (51) and the backrest electrically actuated device (52) is a linear electric actuator.

8. The mechanical stretching device according to claim 3, further comprising a base assembly (1) for supporting the mechanical stretching device on the ground, the seat support (21) is connected to the base assembly (1) by means of a link mechanism, so as to swing in a front-back direction of the seat unit with respect to the base assembly (1).

9. The mechanical stretching device according to claim 8, wherein the link mechanism comprises a swing base plate (22), a front swing rod (23), a back swing rod (24) and a transmission connecting rod (25), respective upper end of both the front swing rod (23) and back swing rod (24) is pivoted to the swing base plate (22), respective lower end of both the front swing rod (23) and back swing rod (24) is pivoted to the transmission connecting rod (25), the swing base plate (22) is fixedly connected to the base assembly (1), and the transmission connecting rod (25) is connected to the seat support (21).

10. The mechanical stretching device according to claim 8, further comprising a swing limit mechanism (6), wherein the swing limit mechanism (6) allows the seat support (21) to swing with respect to the base assembly (1) in the sitting position of the mechanical stretching device, and the swing limit mechanism (6) prevents the seat support (21) from swinging with respect to the base assembly (1) in the relaxing position or the lying position of the mechanical stretching device.

11. A movable seat unit, comprising a seat, a backrest, a footrest member, and a mechanical stretching device as claimed in any one of claims 1-10, wherein the seat support (21) is arranged to attach to the seat, the leg stretching device (3) is arranged to attach to the footrest member, and the backrest support (41) is arranged to attach to the backrest.

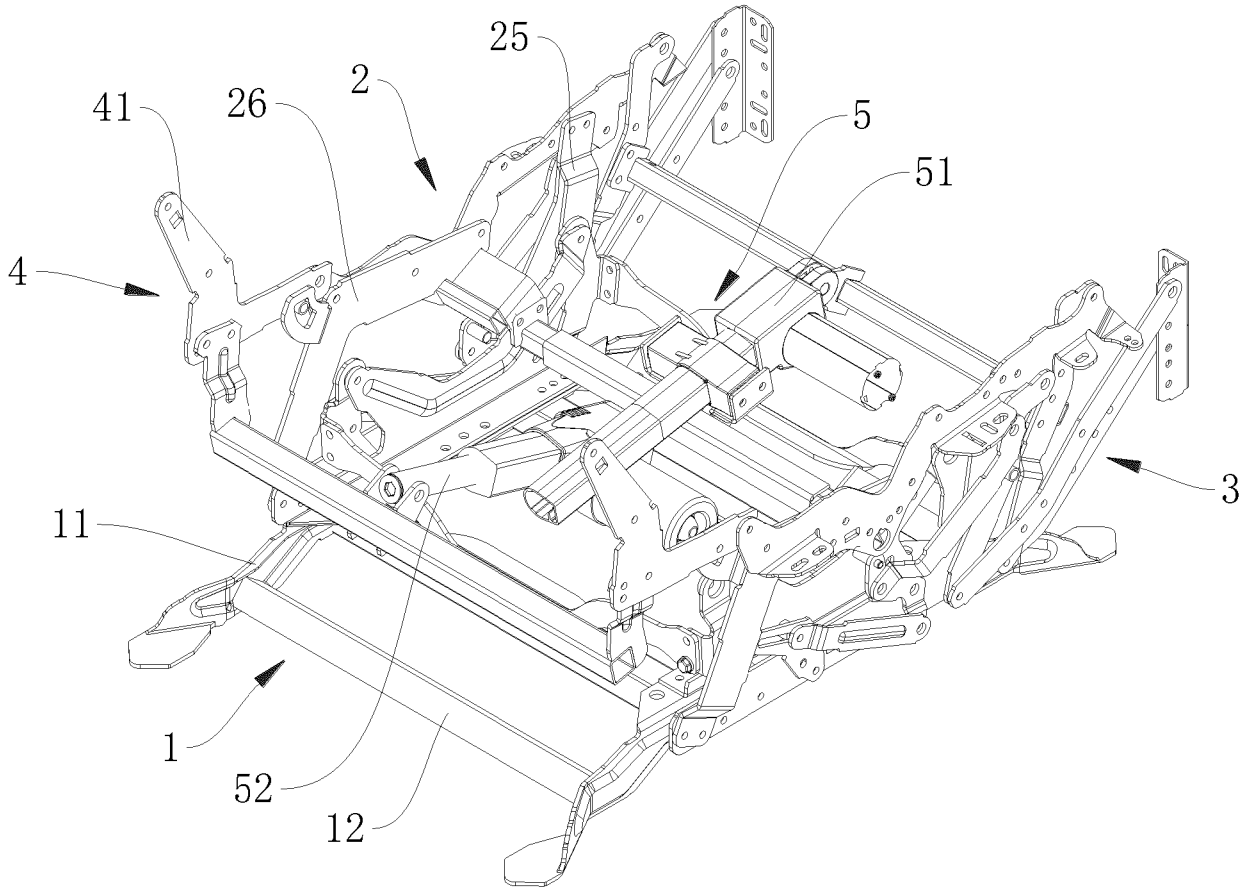

Fig. 1

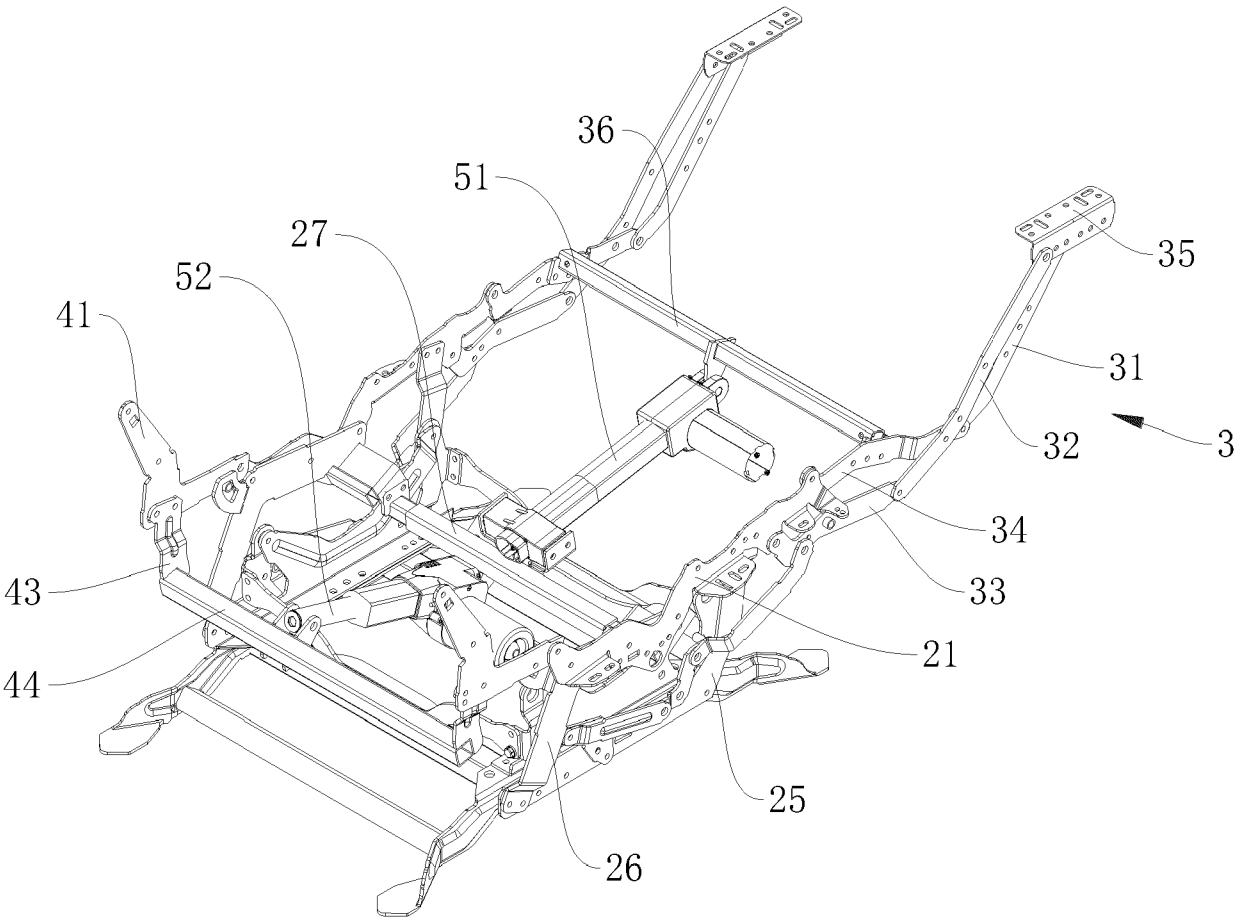

Fig. 2

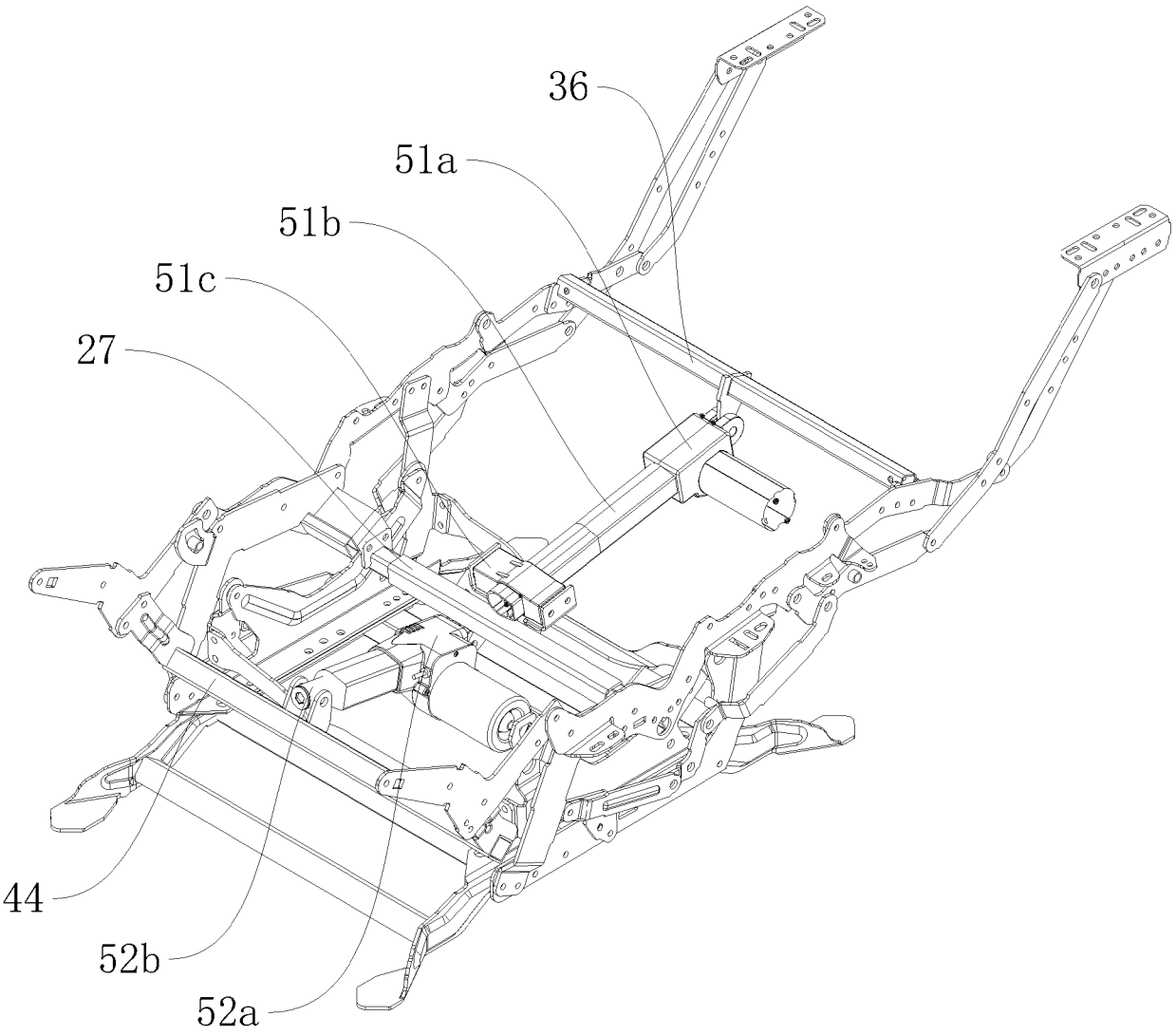

Fig. 3

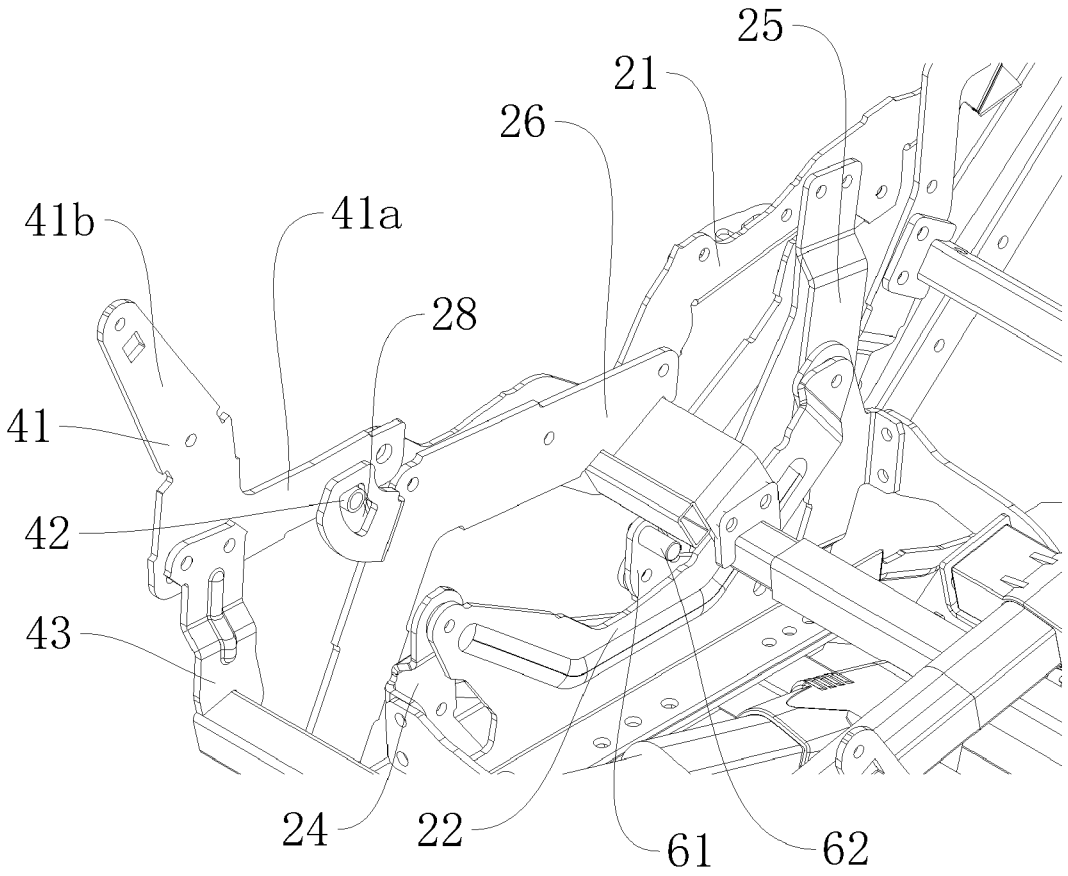

Fig. 4

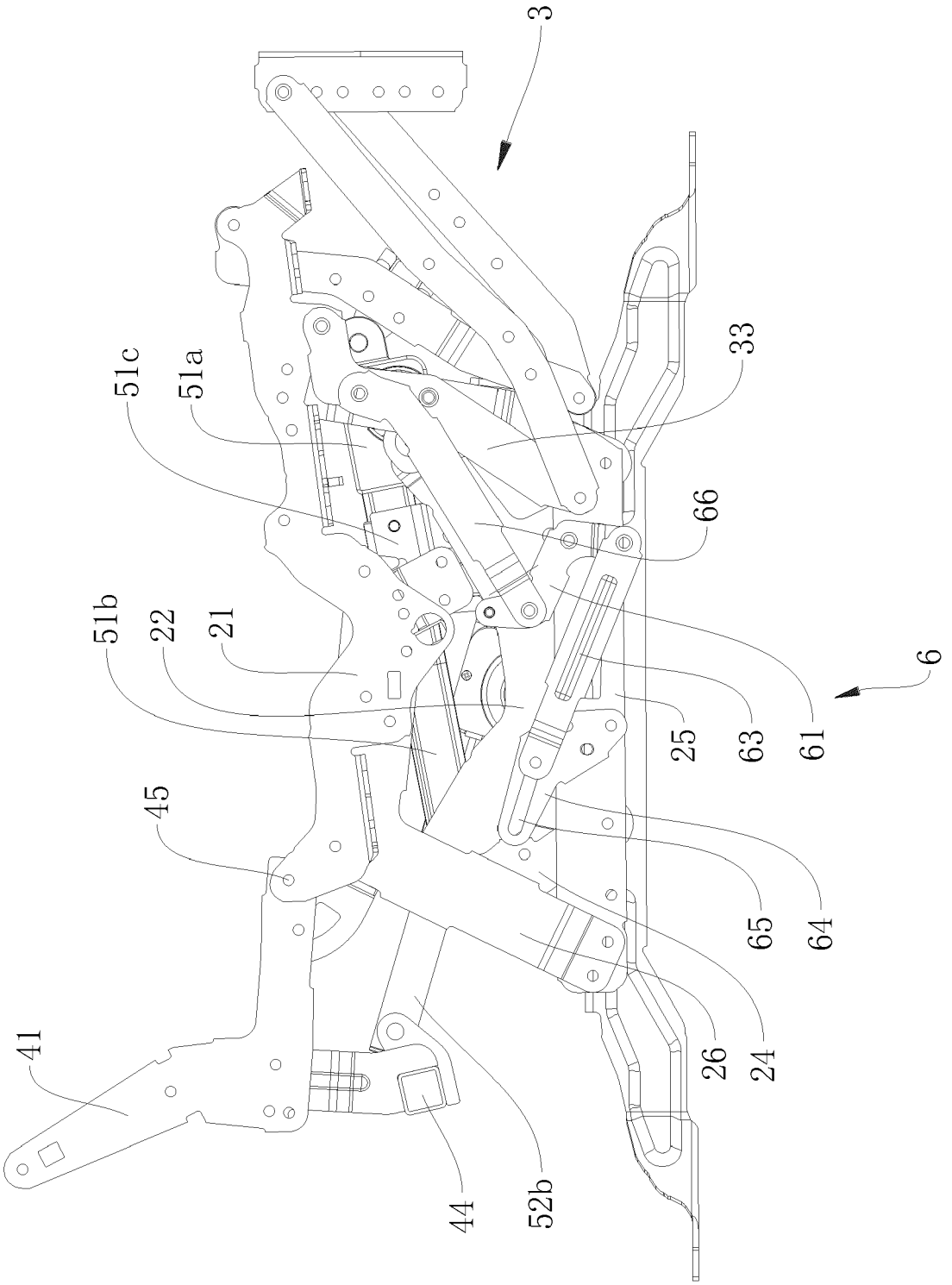

Fig. 5

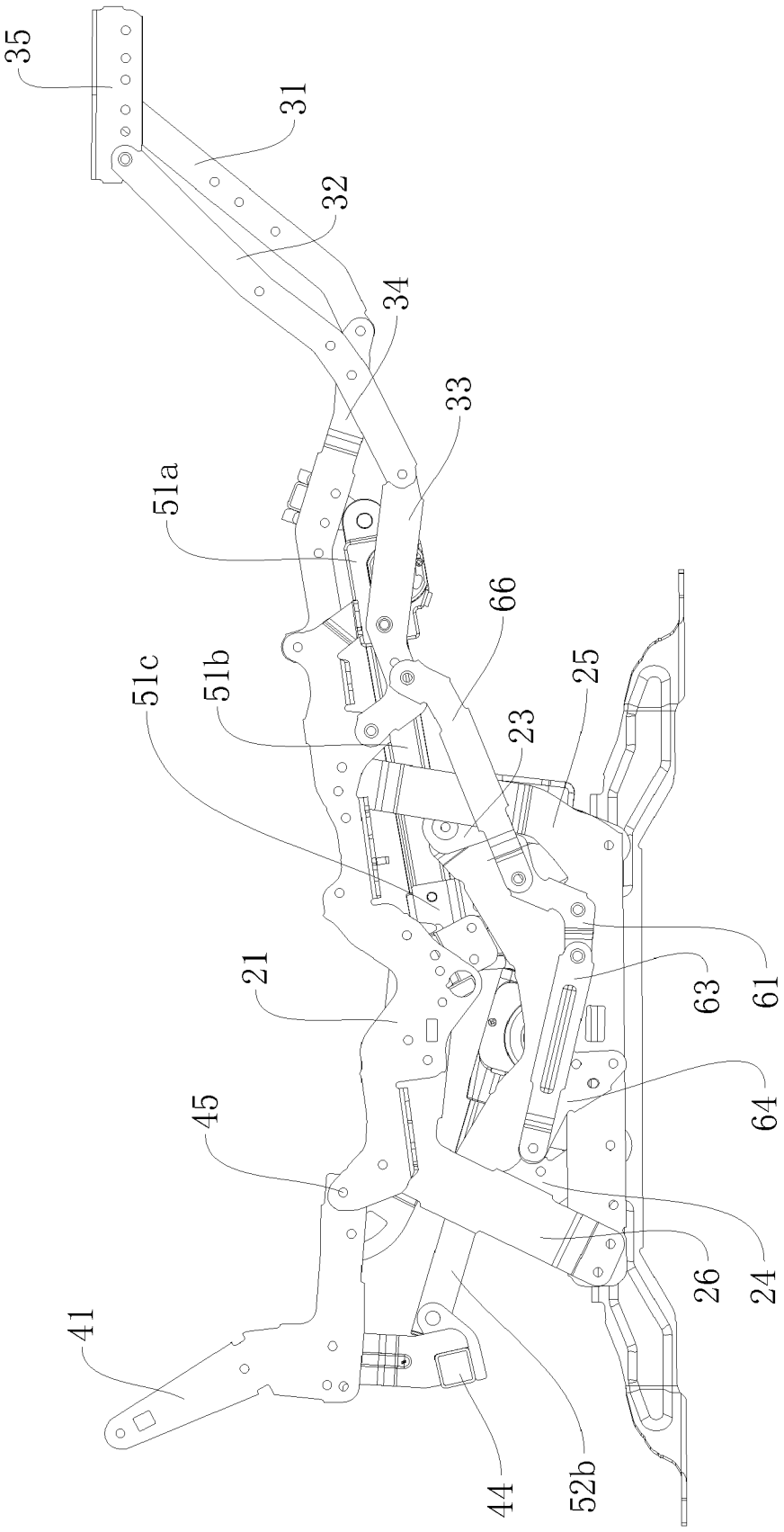

Fig. 6

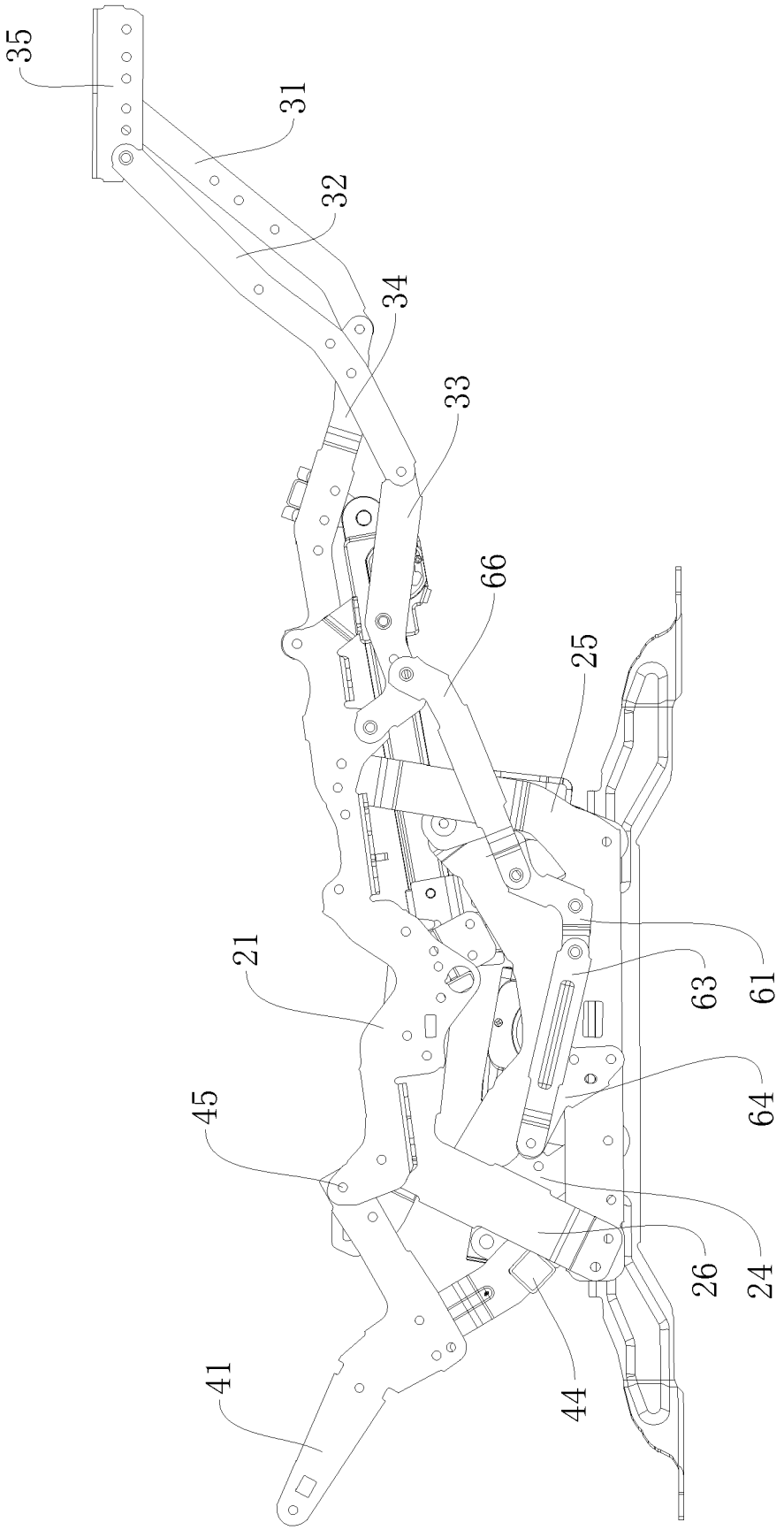

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 24 19 1883

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 November 2024	Lehe, Jörn

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