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(54) **Seating furniture with lifting mechanism to assist getting up**

(57) Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives according to this invention, represents the solution with original kinematic structure of the mechanism in which there is built in at least one torque drive of small motor power, with torque angles less than one half of the revolution and by means of torque motor drives of such a type and specially solved kinematic structure of leverage, there is achieves optimal function of seating furniture at usint lifting function of furniture for the purpose of assistance at rising, by which it improves total possibilities of function of seats. The invention particularly refers to building in torque drives that are leant by the bridge against a pair of lvers of the shear mechanism and that are easily lifted and rotate relatively together with the sher mechanism upwards and to drives there is fastened special lifting leverage, fastened with one end in the axis of drive torque and the other end leans against the support provided in the point above the kinematic square of the lifting shear mechanism. To the shear square system for listing remains only the role of determining the course

of lifting and inclining the seat and lifting the drive and the lever system with starting point in the drive torque axis, exercises in such a way progressive cumulated start of lifting mechanism. Such a lifting is achieved by torque of drive lever system in the way that it drives, which are through the bridge leant against the lever of the shear syste, that lifts them together with torque livers and shear mechanism upwards, simultaneousla moving apart the lever system and special support of seating furniture that, included in the kinematic system progressively cumulatedly lifts and adequately inclines the seating furniture. The lifting system has thereby starting point in the drive torque axis and the other footing is at the minimum distance from the drive torque axis and above kinematic points of lifting shear levers, which is also original solution. The mechanism is very easy and quickly assembled to frames or other mechanisms in the seat, by inserting on axes on the transversal supporting tube of the frame of the seat and by fastening by screws on the other transversal supporting tube of the frame of the seat.

EP 1 891 921 A1

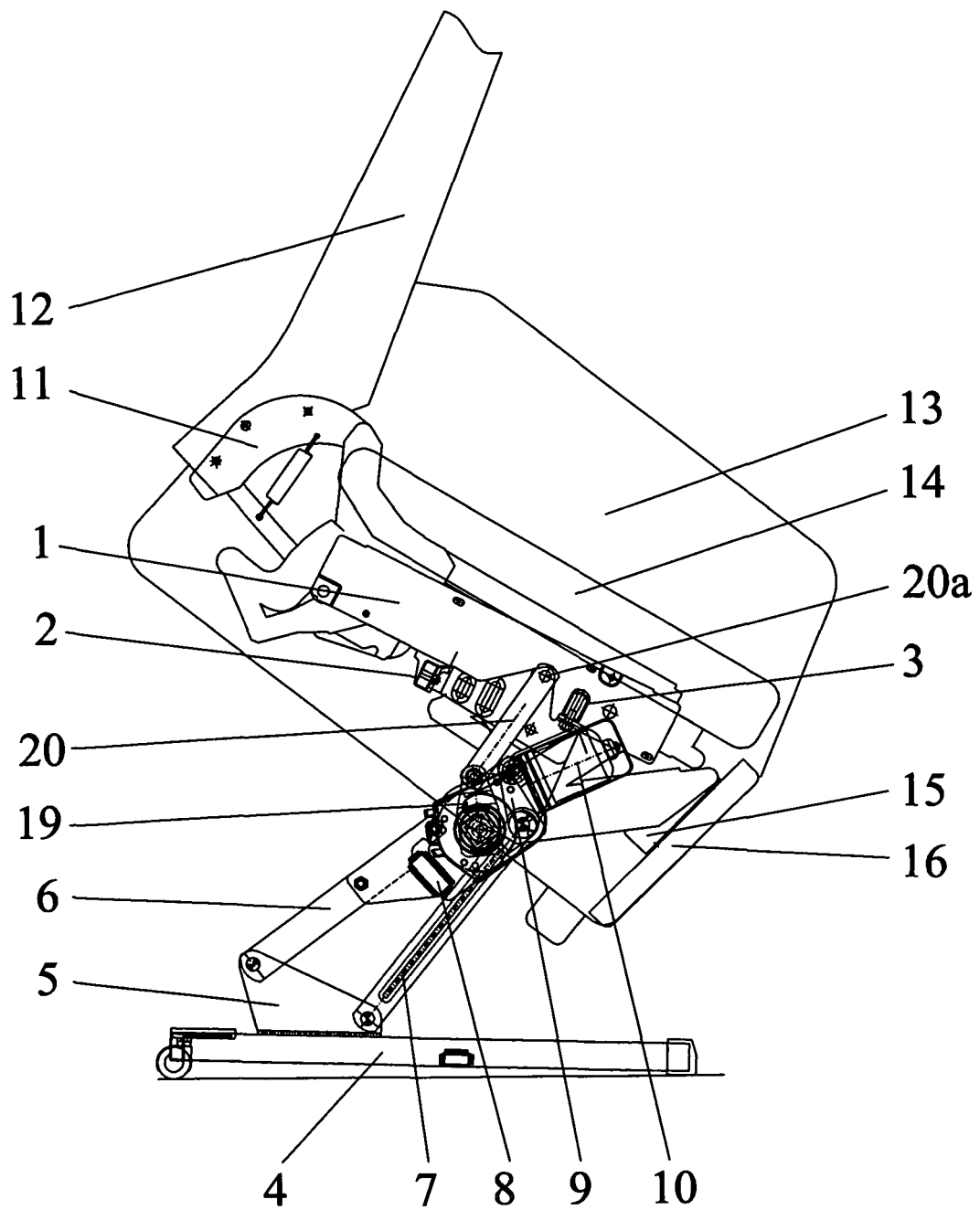


Fig. 1

Description

Field of technique

[0001] The scope of the invention is a seating furniture with mechanism for lifting for the purpose of assistance at rising, with own torque drives, which through kinematically originally solved lever system driven by at least one own torque drive and adequate control, enable synchronized, or independent from other functions of furniture, achievement of position suitable for rising from the seating furniture, by supporting the whole body while rising. The invention particularly refers to building in torque drives, leant by the bridge against a pair of lever of shear mechanism which are lifted together with the shear mechanism upwards and which are by lifting leverage fastened with one end in the torque axis and the other in the support being in the point provided above the kinematic quadrangle of lifting shear mechanism that determines the course of lifting and inclining the seat. In this connection, starting the lifting mechanism is achieved by torqueing the lever system and moving apart support and levers of lifting shears in a special way. Drives are lifted together with torque levers and shear mechanism upwards and thus they lift their support and progressively, cummulatively lift the seating furniture, by contrast to kinematic constructions driven usually by linear drives.

[0002] According to the international classification of patents, the invention belongs to the classification group: A47C-1/035 under the title: chairs, resting chairs with adjustable seat and back wit legs support in combination with movably connected seat and back.

Technical problems:

[0003] Lever mechanisms used in production of chairs - resting chairs in function of assisting at rising from the chair, represent by kinematic structure, complex mechanisms. The complexity results from the need of building in in a very limited space, the need of achieving complex functions of lifting and inclining the whole seating furniture, synchronized operation of the drive, submission to high specific loads and stress, precision of manufacture, comfort in operation, safety of the user and large dynamic lifespan. It is usual to use linear drives of strong power, for starting the mechanism for lifting and inclining the complete seating furniture for the purpose of achieving the function of assistance at rising, which, as a rule, have grips on the extensions below kinematic points of lifting shear levers or within them. There are missing efficient solutions implying possibility of application of torque drives of lower powers, smaller volumes with limited torque for less than one half of revolutions in these systems and which have the lifting system with the origin in the axis of drive torque and the support at the minimum distance from torque axis and above kinematic points of lifting shear levers. Attempts of solving a problem in such a way came down to very complex mechanisms, however

they perhaps achieved only inclination of a part of the seat, without efficient system for lifting and inclining the whole seating furniture in such a way, together with supporting the whole body of a person with normal weight or with the weight above average.

State of technique

[0004] On the market of chairs - resting chairs with adjustment of height for the purpose of assistance at rising, there is a rather large number of various embodiments-models of chairs - resting chairs, as well as lever mechanisms for putting in motion chairs - resting chairs with adjustment of height at rising. The largest number of these chairs achieves their functions by motor driven mechanisms. However, the limitation is, that in such a way driven mechanisms need for the drive relatively strong motors with linear construction of mobile outpoint parts, going out of the housing as pistons, spindles, telescopic outputs etc. Lifting mechanisms are also either connected to drives for achieving other functions of folding chairs or they have separate drive. Linear drives are relatively long and in operation they yet enlarge their length and therefore they need a larger operating space and as they have grips on their ends which are rather distanced one from the other, the leverage should be rather long in order to catch them. Therefore, drives of such a type are placed horizontally and mounted on grips in extensions of kinematic points of shear lever systems. There are missing efficient solutions, that imply the application of torque drives with relatively small motor power and small volumes, with limited torque to less than one half of revolutions in these systems, where drives would lean against the shear lifting system as their starting point and with their torque leverage they would catch and use grips provided above the kinematics of lifting shear. Drives would be lifted and relatively rotated with lifting the system and thus achieve progressive cumulated run. Attempts for solving this problem came down to very complex mechanisms, which did not achieve lifting and inclining the whole chair to a sufficient extent, but possibly only inclination of a part of the seat, without efficient system for lifting and inclining the whole seating furniture with maximum freight and achieving complete support of a whole body with normal or increases weight.

Characteristics of the invention

[0005] Seating furniture with mechanism for lifting for the purpose of assistance at rising, with own torque drives according to this solution, represents the solution with original kinematic structure of the mechanism in which there is built in at least one torque drive with a small motor power, with torque angles less than one half of the revolution and by means of these torque motor drives and specially solved kinematic structure of leverage, there is achieved optimal function of seating furniture at using the function of lifting the seating furniture for the purpose

of assisting at rising and thus the total possibilities of functioning the seats is improved.

[0006] The invention relates particularly to building in torque drives, leant by the bridge against a pair of levers of the shear mechanism and which are lifting and relatively torqued together with the shear mechanism upwards, and to drives there is fastened a separate leverage for lifting, fastened by one end in the drive torque axis and by the other end it is leant against the support provided in the point above the kinematic quadrangle of lifting shear system. To the shear square system for lifting it remains only the role of determination of the course of lifting and inclining the seat and a lever system with in the drive torque axis exercises in such a way progressive cumulated starting of lifting mechanism. Such an lifting is achieved by torque of drive lever system in a way that it drives and they are through the bridge leant against the shear system lever, that lifts them together with torque levers and shear mechanism upwards, and at the same time they move apart the lever system and separate support of a seating furniture, which, included in the kinematic system progressively lifts and adequately inclines the seating furniture.

While doing so, the lifting system has starting point in the drive torque axis and the second starting point at the minimum distance from the drive torque axis and above kinematic points of lifting shear levers, which is also the original solution.

Brief description of illustrations

[0007] Fig. 1 illustrates the side view of the lifted seating chair with lifting mechanism for the purpose of assisting at rising, with the own torque drives and kinematic structure of leverage, places for building in torque drives 9 and the way of connection and transmission of movement of the mechanism to the frame of the seat or mechanism of the seat 1, 2 and 3. The figure also shows other parts of the seat and that the back 12, seat 14, sides 13 and legs support 16 which lift simultaneously and synchronized with the mechanism, supporting the whole body of the user.

[0008] Fig. 2 shows the side view of the lowered closed lifting mechanism for the purpose of assistance at rising, with own torque drives with kinematic structure of leverage, places for building in the torque drive 8, 18 and 24 and the way of connection and transmission of movement to the frame of the seat 2 and 3 or the seat mechanism. At the same time, this is also the illustration of the drive position 9 with engines 10, as well as the drive lifting leverage 19, 20 and 21 in the lower lowered position of the seating furniture.

[0009] Fig. 3 shows the side view of the lifting mechanism for the purpose of assisting at rising, with own torque drives with kinematic structure of leverage, places for building in the torque drive 8, 18 and 24 in the middle position in course of lifting and the way of connection, transmission, movement and opening the lever system

19, 20 and 21 when lifting the seating furniture. At the same time this is also the illustration of position of the lever 6 with the drive bridge 8 with torque drives 9 and engines 10, as well as the progressive cumulated lifting the drive leverage 19, 20 and 21 in moving towards the upper position of the seating furniture.

[0010] Fig. 4 shows the side view of the final upper position of lifted lifting mechanism for the purpose of assisting at rising, with own torque drives with kinematic structure of leverage, places for building in the torque drive 8, 18 and 24 and the way of movement and opening the lever system 19, 20 and 21 in the final upper position of the lifted seating furniture. At the same time this is also the illustration of position of the drive 9 with engines 10, as well as the progressive cumulated move of the drive lifting leverage 19, 20 and 21 to the upper lifted position of the seating furniture.

[0011] Fig. 5 shows the ground-plan of the lifting mechanism for the purpose of assistance at rising, referring to the base and leverage of the mechanism, ground-plan arrangement of the leverage, drive bridge 8, drive supports 24, drive 9, drive axis 9b and parallel bilateral allocation of the square kinematic system of leverage 5 - 21 for determination of the course of lifting and inclining the seating furniture. It is also shown the separate shoe like form of the base-foot 4, lifting mechanism for assisting at rising.

Description of the embodiment and function of the invention:

[0012] Seating furniture with lifting mechanism for the purpose of assisting at rising, with own torque drives according to this invention, represents a special kinematic system that enables, synchronized with other functions of the furniture, achievement of a position, suitable for rising from the seating furniture, with full support of the whole body of a person with normal or increased body weight during the whole process of rising, in the way, that it has in a special way built in at least one torque motor drive 9, with small motor power 10, with torquing less than one half of revolution of exit transmitter of torque 9a, which through kinematically originally solved pair of lifting system of leverage 19, 20, 20a and 21, driven by at least one own torque drive 9 leant against supports 24 and lifting bridge 8 leant against the shear system 5, 6, 7, achieve joint progressively cumulated movement of the whole lifting mechanism and consequently inclination of the whole seat as well.

[0013] This is achieved in the way that torque drives 9 which are through fastening plates 24 and the bridge 8 and 18 mounted on the upper pair of lever 6 of the square shear system 5, 6, 7 and 22, by torque of drive levers 9 directly connected in the axis of drive torque axis 9a and through joints 19a and lifting levers 20, lean against supports 20a and in this way open the supports of the mechanism 21 with reference to a pair of levers 6 of the shear system and the bridge 8.

[0014] By this moving apart the opening angle between supports 21 and a pair of levers 6 is enlarged, by which the square shear system 5, 6, 7 and 22 moves in its joints and lifts the whole system progressively cumulated upwards.

As to the supports 21 and 22 there are connected transversal supports 2 and 3, frames and thus seats 11-16 as well, by this movement the whole seat 11-16 is lifted upwards and inclining forwards together with a maximum freight and supports the whole body of a person with normal weight or the weight above average, when rising.

[0015] Torque drives 9 are leant against the bridge 8 and 18 and thus on a pair of levers 6 of the shear mechanism and are lifted together with the shear mechanism upwards. In this connection, starting the lifting system 5, 6, 7 and 22 is achieved by torquing and opening the support 22 directly connected with the support 20a, which is, in this solution, provided above the whole kinematic system and because of simultaneous lifting the leverage and bridge 8 and maintenance of a small distance it is always available to the short leverage 19 and 20 of drive torque axis 9a, keeping its support always near to the grip of the lifting system 20a. By this it is enabled continuous use of short distance between the drive footing 24 and the support 20a for achieving larger cumulated move of lifting square shear system, and by this also lifting and inclination of the whole seat.

[0016] At lifting the bridge 8 with drives 9 and torquing the drive 9, the lower part of the space is released, by which it is made available and safe without the need of special mechanical protection against injuries of the user which is also different from kinematic structures driven by usual linear drives.

[0017] The invention enables, individually or in pair, the connection of torque 9a and stator part of the drive 9, in the same torque axis 9b, which axis tallies with the starting point of torque axis of the leverage for starting the lifting mechanism and the connections to parts of the mechanism 19 is direct. This axis 9b and drives 9, move in the space together with kinematic movements of quadrilateral shear mechanism for lifting 5, 6, 7 and 22, while maintaining their grip 20a always within reach of the lifting leverage 19 and 20.

[0018] Movement of stator 9 and 24 or torque parts 9a, torque drives 9 are used mutually alternatively as firm supports or as dispensers of torque motion to leverage, depending on necessary way of connecting, enabling thus additional advantage in using available space.

[0019] The leverage system is also solved in such a way, that it enables very easy and quick assembly to the construction of seating furniture or its mechanisms by simple putting on leading small axes 29, 30 and 31 and by fastening with screws 32, 33 and 34 to the transversal support 3. Supplemental assembly of special systems is not necessary.

[0020] The basis of the mechanism is the base 4 in form of a horse shoe, bended from one piece of tube and transversally secured by spreader reinforcement 25. The

base may be equipped with wheels 17, stable footings or straight covers-supports on which there are placed two supporting plates 5, constituting the basis of kinematic system with two turning points and supports of the leverage 6 and 7, lifting mechanism. Wheels 17 of the main base 4 may be at the same time also wheels of the furniture in which there is built in the lifting mechanism, because they always remain on the floor.

[0021] When lowering the mechanism and thus the seat also by means of main supports of the mechanism 21, after the seat was put down to the floor, the main base 4 is, at further movement of the drive, lifted with its open part from the floor, pulled within the upholstered part of sides of the seat 13 and becomes invisible outside the upholstered part of the seat.

[0022] Torque drives have different and specific placement and kinematic structure of leverage of drives 19, 20 and 21, as well as main grips of drives 9a and 20a. This leverage and grips are placed kinematically in the upper part of the mechanism, above lifting levers 6 and 7 of the seat and as support for their additional progressive and cumulated operation they use a pair of levers 6 with the bridge 8, which transmit drives upwards and enable achievement and action to grips 20a and lifting the seating furniture with relatively small runs of drives. Such an placement and kinematic structure of drive system of the mechanism represents also the particularity of this invention.

[0023] Various final positions of lifting the seat may be achieved by combination of various sizes of kinematic distances between turning points of the shear leverage 5, 6 and 7, resp. combinations of lengths and forms of levers in shear leverage.

[0024] Torque of the drive 10, through shifting the complete leverage, lifts the frame of the seat, so that the seat is stable in each of positions, because turning points of the shear leverage make connected quadrangles enabling various always stable positions of the support 21 and in such a way of the complete seat and the user feels safe achievement of lifting, lowering and inclination of the seat, for the purpose of assistance at rising. By building in flanges in connections and turning points it is avoided sticking, varied movements, twitching or striking parts of shear, and therefore is the operation of the system noiseless, silent and continuous. In this way, we obtain the system enabling full achievement of set lifting functions for the purpose of assistance at rising from seating furniture, comfortable operation and use, durability and other characteristics, by using drives of smaller volumes, as well as improvements with reference to usual state.

[0025] Built in torque drives have safety one-way operation run and return movement is achieved owing to the weight of the seat and the user, without the need of any change of the described kinematic structure and form of the shear mechanism. In this case, the safety of the user is also very high. The end lower position of the mechanism is determined and limited by lowering the mechanism to the base itself and further accidental or intentional

starting is impossible, because in any attempt of exceeding the run, the lever of the drive 19 leans with special stopper against the end anticipated support in the drive support 24 and switches on end switches or safety one-way couplings in the interior of the drive. In the same way, the end upper position is mechanically limited by achieving end points of movement of the shear mechanism, by leaning the lever 19 on the stopper on the support 24 and switching on the end switch of the drive. By doing this, the movement of the mechanism is safe within set limits and further movement is impossible which would be dangerous for the user in any regard. In the same way, by means of insurance against current overload or other safety solutions it will be achieved threefold insurance against movement out of the set limits and all possible dangers for the user shall be completely eliminated.

[0026] The described kinematic structure of the mechanism for lifting seating furniture in function of assistance at rising, with the own drive, by means of torque motor drives, as well as its constructional solution, enables that functions take place individually, independently, partly or to end points by return starting from any current position or continuation of movement from any position, by various sequence and synchronized. The way of operation shall depend on the wish of the user and solution of electronic control of torque drive.

[0027] The described constructive solution of the invention represents also the reliable, safe and durable product that enables comfortable control of the seat in which there is built in, achievement of high performances, comfort and safety of the same.

Claims

1. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives **characterized in, that** its kinematic system of torque lifting levers (19, 20, 20a, 21 and 22) is provided above the quadrangle shear system of lifting leverage (5, 6, 7 and 22) and that directly to torque levers of this system (19) to the same torque axis (9b) there is connected at least one torque motor drive (9) of a small motor power (10) with torque less than one half of the torque of exit transmitter of movement (9a), which by direct connection to the drive lever (19) and torquing the levers (19) included in the kinematic system of lifting leverage (19, 20, 20a, 21 and 22) and leant on the one side against supports (24) and lifting bridge (8) and over the bridge (8) to the shear system (5, 6 and 7) and on the other side against the support (20a) and the support (22) achieves common progressive cumulated movement of the shear system (5, 6 and 7) and lifting levers' system (19, 20, 20a, 21 and 22) and by doing this the whole mechanism also, that enables synchronized with other functions of the seating furniture,

lifting the seat, achievement of the position suitable for rising from the seating furniture with full support of the whole body of the person with normal weight or increased weight, in course of rising.

2. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives according to the claim 1 **characterized in, that** torque systems have kinematic structure of leverage of drives (19, 20 and 21) and main grips of drives (9a and 20a), arranged kinematically in the upper part of the mechanism, above lifting levers (6 and 7), seat, so that together with drives (9) as support for their additional progressive cumulated operation, they use a pair of levers (6) with the bridge (8) that transmit drives to upwards and enable reaching and impact on grips (20a) and lifting the seating furniture with relatively small runs of the drive and such an positioning and kinematic structure of the drive system of the mechanism, makes such an achievement possible.
3. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives according to the claims 1 and 2 **characterized in, that** torque drives (9), mounted over fastening plates (24) and the bridge (8 and 18) on the upper pair of levers (6), square shear system (5, 6 and 7) by torquing drive levers (19) directly connected in the axis of drive torque axes (9a), through joints (19a) and lifting levers (20), lean against supports (20a), thus opening supports of the mechanism (22) and specially solved system of connected supports (21) connecting the leverage system for lifting (19, 20 and 21) and shear system (5, 6, 7 and 22) through transversal seat supports (2 and 3) and in such a way as the complete supporting system, moving apart seat supports (21, 1, 2 and 3) with regard to the pair of levers (6), shear system and the bridge (8) and that by this moving apart the opening angle between the support (21) and the pair of levers (6) is enlarged, by which the square shear system (5, 6, 7 and 22) is moving in its joints and starts the whole system progressively cumulated upwards and lifts and inclines the seat.
4. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives **characterized in, that** torque drives (9) are leant against the bridge (8 and 18) and by this also against a pair of levers (6) of the shear mechanism and are lifted together with the shear mechanism upwards, whereby the lifting leverage (19 and 20) is connected to the support (20a) provided above the whole kinematic system and that because of simultaneous lifting leverage and the bridge (8) there is maintained a small distance between the support (20a) and drive torque exits (9a), making the support

(20a) always within the reach of the short leverage (19 and 20) and that by this the use of relatively small torque runs of the drive (9) for achieving larger cumulated run of the lifting square shear system (5, 6, 7 and 22) is enabled, with sufficient lifting and inclination of the whole seat.

5. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives **characterized in, that** built in torque drives have safety one-way torque run and return movement is achieved as a consequence of the weight of the seat and the user, supported by the return run of the drive, without any need of change of the described kinematic structure and form of the shear mechanism and that in this case safety of the user is increased to a large extent; further that the end lower position of the mechanism is determined and limited by lowering the mechanism to the base itself and further accidental or intentional start is impossible, because in each attempt of exceeding the run, the drive lever (19) leans with special stopper against the end anticipated support in the drive support (24) and switches on eng switches or safety one-way coupling in the interior of the drive and in the same way the eng upper position is mechanically limited by reaching end points of movement of the shear mechanism, by leaning the lever (19) against the stopper on the support (24) and switching on the end switch of the drive, such that in this way the movement of the mechanism is safe within set limits and further movement is impossible, which would in any regard, be dangerous for the user; further that through insurance against current overload there will be achieved also threefold insurance against movement outside set limits and all possible dangers for the user shall be eliminated to the fullest extent.
6. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives **characterized in, that** at lifting the bridge (8) with drives (9) and by torquing the drive (9) together with the motor (10) the lower part of the space below the drive is released, by which it is made available for cleaning and safe without the need of making special mechanical protection against injury of the user, which is also different from kinematic structure, driven by the usual linear drive.
7. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives **characterized in, that** it enables the position and connection of the torque (9a) and stator part of the drive (9) in the same torque axis (9b), which axis tallies with the starting point of the lever torque leverage for starting the lifting mechanism (19 and 29), because the connection to parts of the mechanism (19) is direct and that with more drives connected in

such a way, we can, without change of kinematics of the remaining part of the mechanism, achieve in case of need, higher load capacities, as the whole axis (9b) with drives (9) moves in the space together with kinematic movement of the quadrilateral lifting shear mechanism (5, 6, 7 and 22), maintaining both grips (20a) always within the reach of lifting leverage (19 and 20).

8. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives **characterized in, that** movements of stator (9 and 24) or torque parts 9a of torque drives (9) are used mutually alternatively as firm supports or as dispensers of torque movements to the leverage, depending on necessary way of connection, enabling additional advantage in using the available space.
9. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives **characterized in, that** the reception system is solved in such a way, that it enables very easy and quick assembly of the lifting mechanism, on the construction of seating furniture or its mechanism for starting other parts of seating furniture, by simple putting on leading axes (29, 30 and 31) on the transversal support (2) and fastening with screws (32, 33 and 34) to the transversal support (3) and that supplementary assembly of special systems is not necessary.
10. Seating furniture with lifting mechanism for the purpose of assistance at rising with the own torque drives **characterized in, that** the basis of the mechanism consists of the base (4), ground-plan shaped in form of the horse shoe, bended of one piece of tube and transversally secured by spreader reinforcement (25) and that it may be equipped with small wheels (17) and supports of small wheels use radius of the foot in form of a horse shoe as transversal reinforcements for additional higher load capacity, stability and sturdiness.

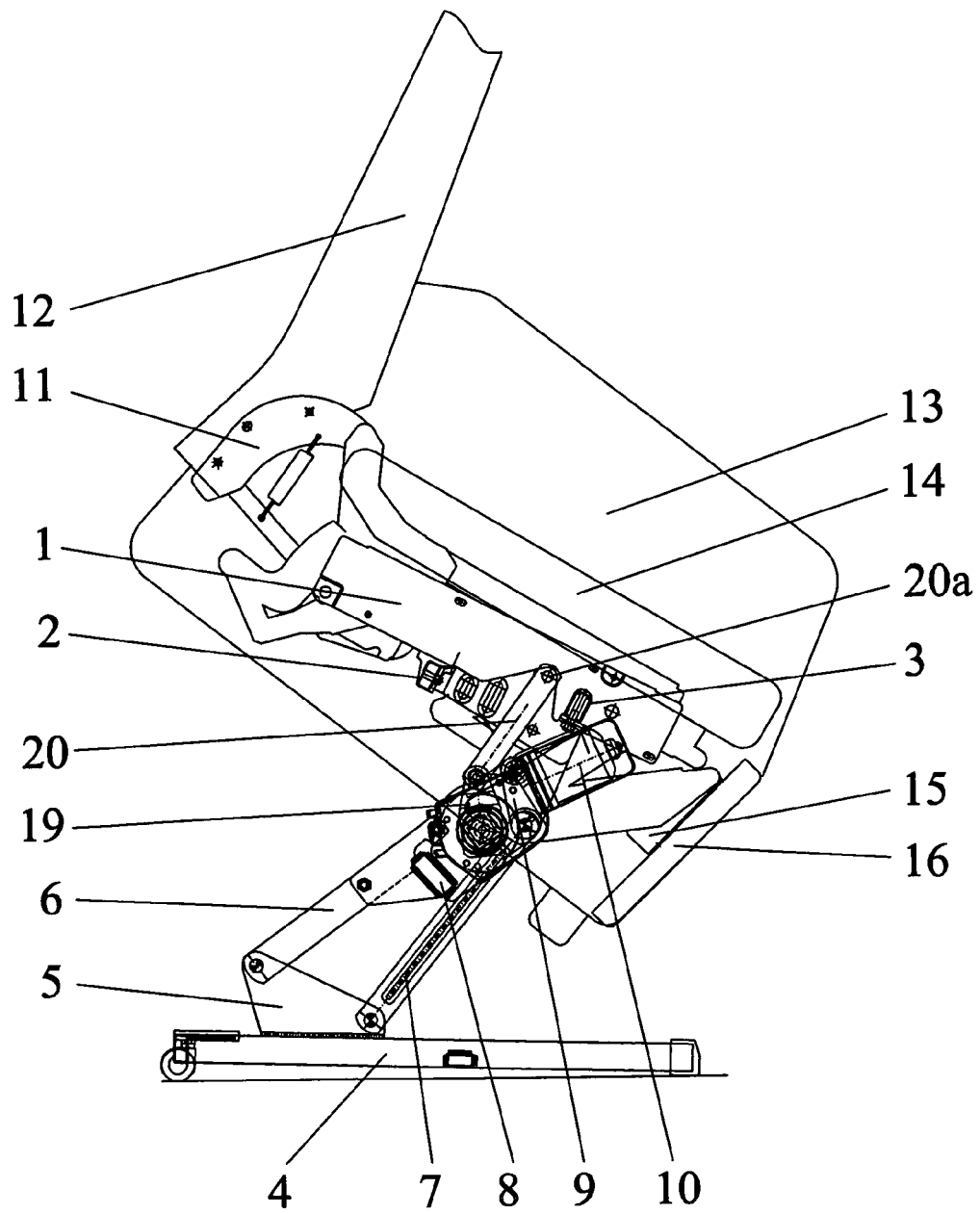


Fig. 1

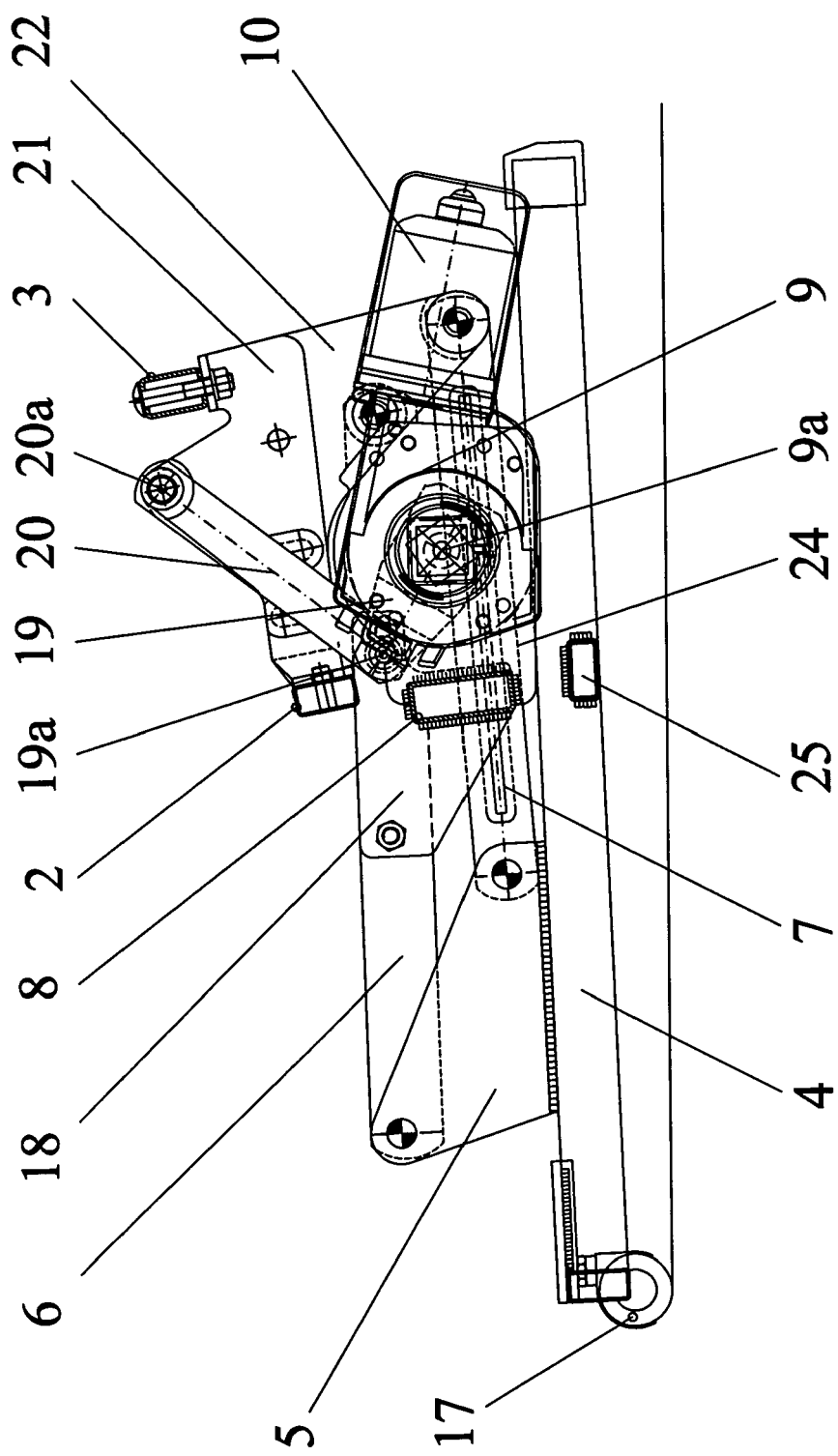


Fig. 2

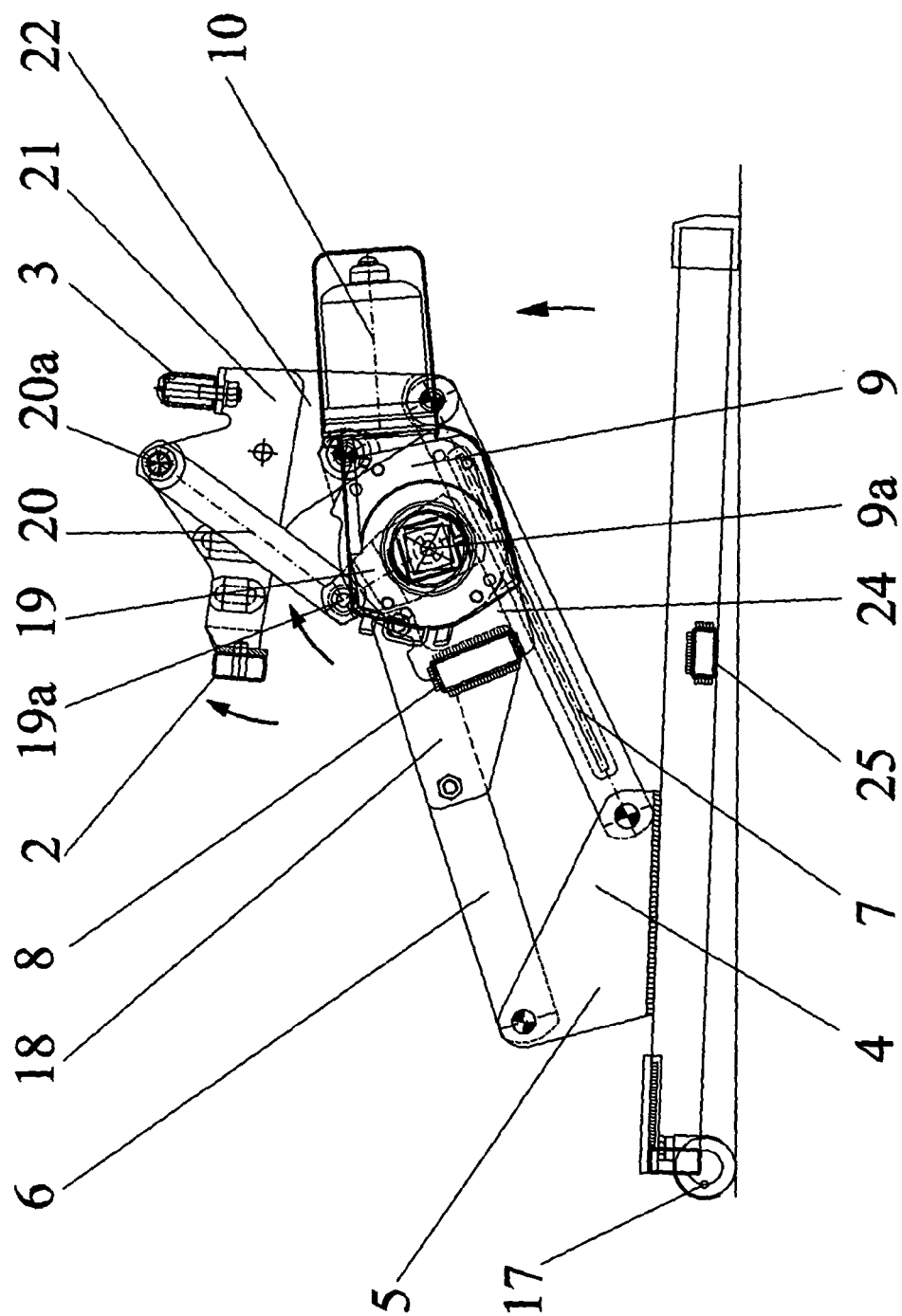


Fig. 3

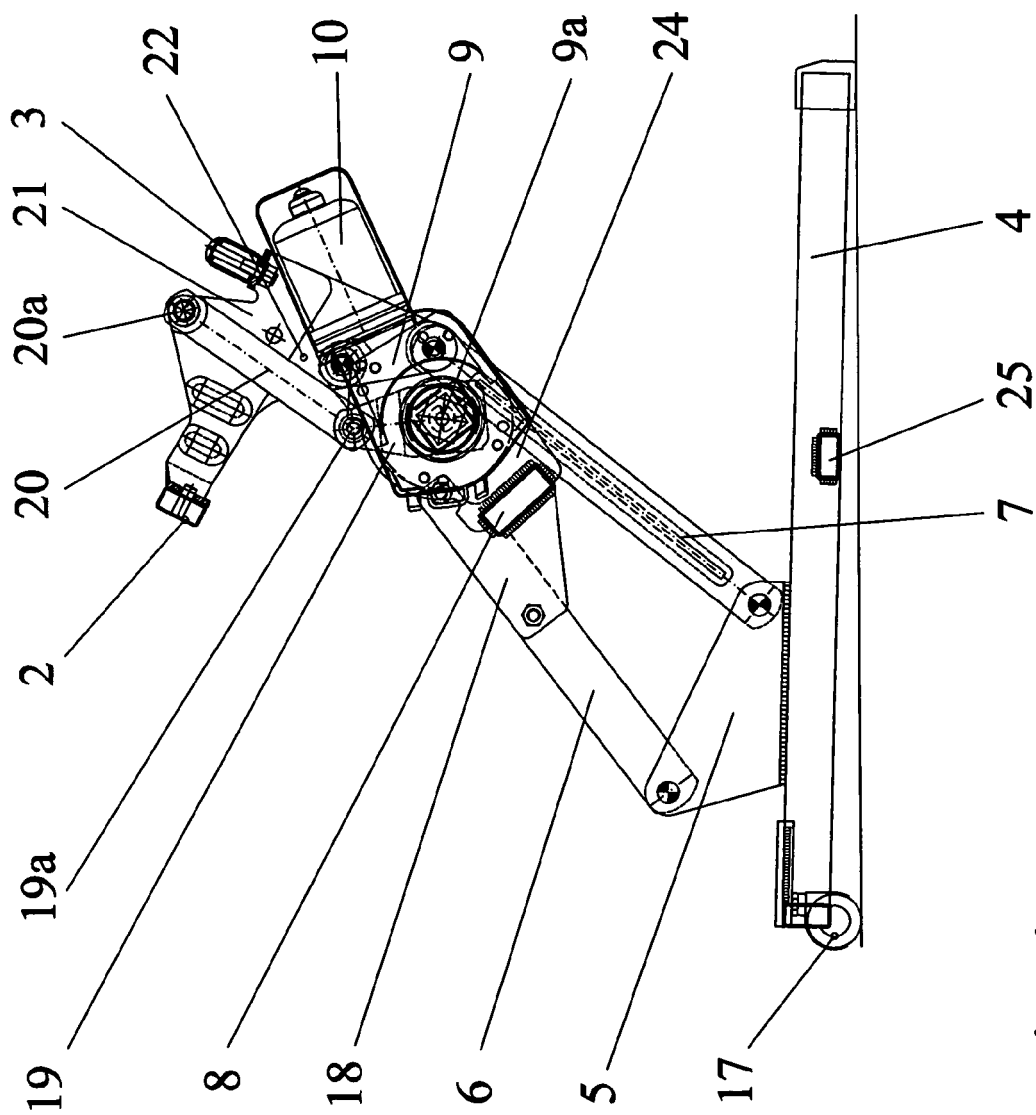


Fig. 4

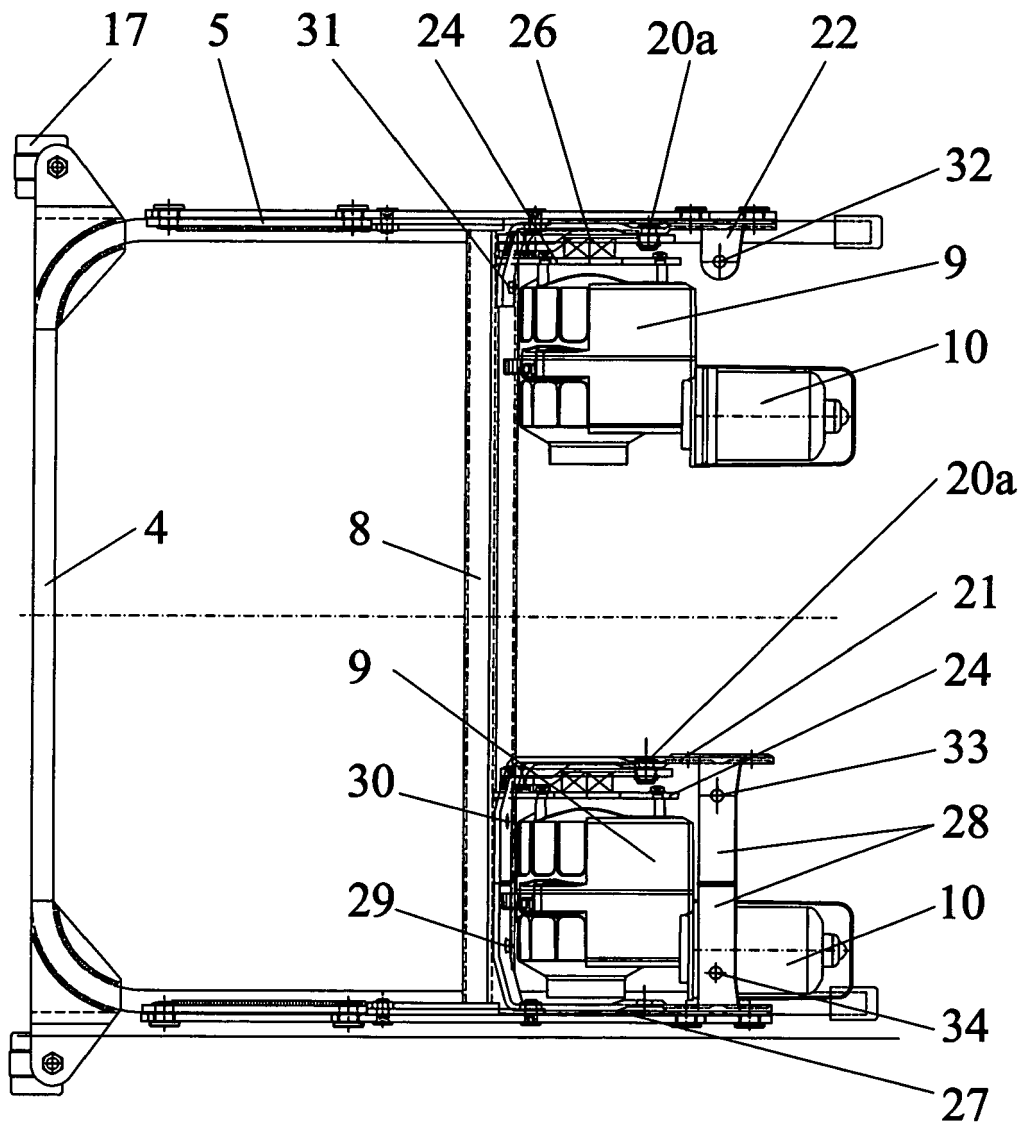


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 01 7354

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 984 411 A (GALUMBECK) 16 November 1999 (1999-11-16) * figures *	1	INV. A61G5/14
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 January 2007	Examiner Kis, Pál
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4
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 01 7354

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