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(54) CABLE-OPERATED HEADREST FOR A SEAT, AND SEAT

(57) A headrest (20) for a seat (40) and a seat (40) comprising the headrest (20) are provided. The headrest (20) comprises a headrest support frame (21), an actuator (22) and a transmission means (23-28). A lower end of the headrest support frame (21) is pivotably connectable to an upper end of a backrest (41) of the seat (40) so as to enable a pivotal motion of the headrest (20) relative to the backrest (41) around an axis extending in a transverse direction of the headrest support frame (21). The actuator (22) is connectable to the seat (40) and configured to actuate the headrest support frame (21). The transmission means (23-28) mechanically interconnects the actuator (22) and the headrest support frame (21), and comprises a cable exerting a tension on the headrest support frame (21) in both directions of the pivotal motion so as to adjust a pivotal position of the headrest (20) and to hold the headrest (20) in the pivotal position if the actuator (22) is not actuated.

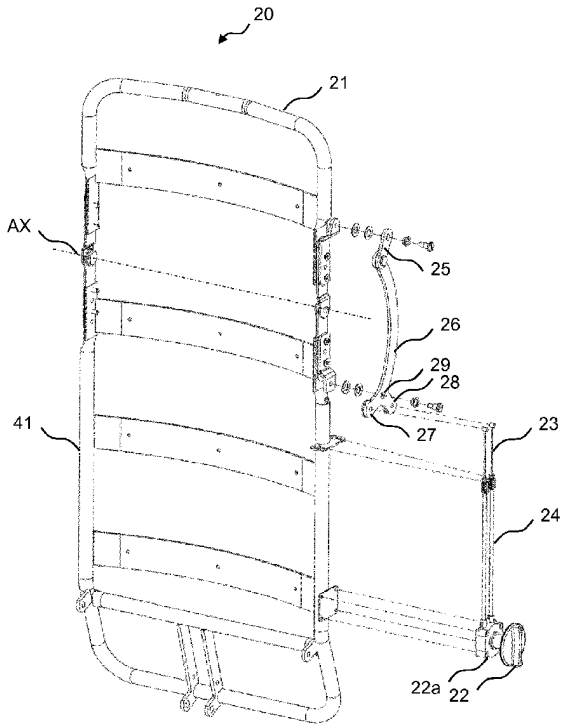

Fig. 2C

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a headrest for a seat and to a seat comprising the headrest. Various embodiment relate in particular to a headrest for seating furnitures.

BACKGROUND OF THE INVENTION

[0002] Seating furnitures may be configured to allow adjustment of a backrest, in particular a pivotal adjustment of an upper portion thereof known as headrest. Upon completion of the adjustment, the headrest must be held firmly in the attained pivotal position.

[0003] In case of manually adjustable headrests, the pivot connection is usually implemented by hinges using friction fit or form fit to keep the headrest in position. By contrast, motor-driven headrests using freely pivotable hinges require additional means to maintain the headrest stationary, such as a force-transmitting rod-shaped or bar-shaped member mechanically interconnecting the motor and the headrest.

[0004] This may result in design restrictions for the seat. For example, the motor has be mounted proximate to the pivotable headrest, the force-transmitting member must be accommodated in the seat design, and so on.

BRIEF SUMMARY OF THE INVENTION

[0005] In view of the above, there is a continued need in the art for headrests and corresponding seats which address some of the above needs.

[0006] These underlying objects of the invention are each solved by the headrest for a seat and by a seat comprising a headrest as defined by the independent claims. Preferred embodiments of the invention are set forth in the dependent claims.

[0007] According to a first aspect, a headrest for a seat is provided. The headrest comprises a headrest support frame, an actuator and a transmission means. A lower end of the headrest support frame is pivotably connectable to an upper end of a backrest of the seat so as to enable a pivotal motion of the headrest relative to the backrest around an axis extending in a transverse direction of the headrest support frame. The actuator is connectable to the seat and configured to actuate the headrest support frame. The transmission means mechanically interconnects the actuator and the headrest support frame, and comprises a cable configured to exert a tension on the headrest support frame in both directions of the pivotal motion so as to adjust a pivotal position of the headrest when the actuator is actuated and to hold the headrest in the pivotal position if the actuator is not actuated.

[0008] The term "headrest" as used herein refers to an upper end or extension portion of a backrest of a seat, chair or sofa that provides support for a head of a person to lean back against while sitting.

[0009] The term "seat" as used herein refers to piece of furniture that at least one person can sit on.

[0010] The term "chair" as used herein refers to a seat for one person that has a sitting area, a backrest and a base.

[0011] The term "sofa" as used herein refers to a seat for more than one person that has one or more sitting areas, one or more backrests and one or more bases.

[0012] The term "backrest" as used herein refers to a support for a person to lean back against while sitting.

[0013] The term "transverse" as used herein refers to lying or being across, and in particular, extending or being oriented at right angles to something else. For example, a "transverse direction" refers to a direction which extends or is oriented at right angles with respect to a given orientation or direction, in particular a regular orientation or direction upon installation, of a reference item.

[0014] The term "actuator" as used herein refers to a device providing a desired mechanical motive power. For example, an actuator may be an electric motor in combination with a machine element, in particular a transmission, to adapt a rotational motive power of the electric motor to the desired motive power or movement.

[0015] The term "transmission means" as used herein refers to any arrangement capable of transmitting mechanical power or movement.

[0016] The terms "pivotable" and "pivotably" as used herein refer to an ability or capability of turning or tilting around an axis.

[0017] The term "cable" as used herein refers to a rope made of wires that are twisted together.

[0018] Advantageously, a cable exerting a tension on the headrest support frame in both directions of the pivotal motion stabilizes the headrest at all times of operation. In more detail, if not actuated, a same tensile force is applied on the headrest support frame in both possible directions of the pivotal motion, holding the headrest in its desired pivotal position. Actuation of the headrest merely introduces additional motive power into the cable which in one direction of the pivotal motion increases the exerted tension and pulls the headrest, and in the other direction of the pivotal motion diminishes the exerted tension so that the headrest can follow the tensile force. Particularly, such a cable-based transmission means may substitute rod-shaped or bar-shaped transmission means known in prior art, and may be applied to arbitrary types of headrest tilt mechanisms.

[0019] Advantageously, a cable transmits tensile forces, and can be routed and mounted along long and curved cable paths. This eliminates design restrictions for the seat existing in prior art, which are due to force transmission vial linkages, brackets, and/or rods connected to the drive. For example, the drive can be installed at almost any position in the seat or in the backrest thereof, rather than requiring mounting proximate to the pivotable headrest. As another example, the cable can

easily be accommodated in the seat design, as it is a petite and flexible machine element.

[0020] According to some embodiments, the transmission means further comprises a linkage, the cable is configured to transform a rotary motion of the actuator to a pivotal motion of the linkage, and the linkage is configured to transmit its pivotal motion to the headrest support frame.

[0021] The term "linkage" as used herein refers to any arrangement comprising rod-shaped or bar-shaped links and capable of transmitting mechanical power or movement.

[0022] According to some embodiments, the actuator comprises a friction element, such as a pulley, providing the rotary motion, and the cable is configured to circumferentially engage a periphery of the friction element so as to accommodate the rotary motion.

[0023] The term "friction element" as used herein refers to any mechanical element capable of transforming a rotary motion into a pulling motion of a cable by means of friction fit.

[0024] The term "pulley" as used herein refers to an axisymmetric disc-shaped machine element having a central hole capable of receiving an output shaft of the drive and a circular periphery capable of receiving one or more windings of the cable so as to engage the periphery of the pulley by friction fit.

[0025] Advantageously, the drive and the cable may be off-the-shelf components, resulting in the headrest becoming less expensive.

[0026] According to some embodiments, the linkage comprises an upper link, an upper end thereof being pivotably connected to the headrest support frame, and a lower link, a lower end thereof being pivotably connectable to the backrest at a pivot. The upper and lower links are pivotably interconnected, so as to transmit a pivotal motion of the lower link via the upper link to the headrest.

[0027] Advantageously, the above-identified linkage is simple to design and manufacture, and not prone to error.

[0028] According to some embodiments, the lower link comprises forward and rearward actuation projections extending from the pivot in substantially opposing relation to each other and being connected to opposing ends of the cable, so as to transform the rotary motion of the actuator to the pivotal motion of the lower link.

[0029] In particular, if the headrest is being actuated, the additional tensile force due to actuation and introduced to the cable by the friction element is transmitted along the cable to the lower link's forward and rearward actuation projections, resulting in the pivotal motion of the lower link.

[0030] According to some embodiments, the cable is a Bowden cable comprising an outer tube and an inner cable, ends of the inner cable are connected to the forward and rearward actuation projections, and ends of the outer tube are connected to the backrest proximate to the lower link.

[0031] Advantageously, if the headrest is being actuated, connecting the ends of the outer tube to the backrest results in the outer tube of the cable remaining in place, and not interfering with any other components.

[0032] According to some embodiments, the inner cable is made of steel.

[0033] Advantageously, a steel cable may receive and transmit high tensile forces at low weight, and is resistant to tearing. In other words, a steel cable is not prone to error.

[0034] According to some embodiments, a biasing means being configured to bias a pivotal motion of the headrest relative to the backrest.

[0035] According to some embodiments, the biasing means is a spring arranged at a pivot of the headrest support frame relative to the backrest.

[0036] Advantageously, such a biasing means, in particular spring, may reduce a threshold force at which a pivotal motion of the headrest is enabled in one direction, and increase a threshold force at which a pivotal motion of the headrest is enabled in the other direction of the pivotal motion, resulting in a preferential direction of pivotal motion. In other words, it may be simpler to tilt the headrest in a forward direction than in a backward direction, or vice versa. In addition, such a biasing means may also be used to avoid unstable operation over a dead point, and/or compensation clearance out of a pivot point.

[0037] According to some embodiments, the actuator comprises an electrical drive and a gearbox being configured to actuate the friction element.

[0038] According to some embodiments, the gearbox is made of plastic.

[0039] Advantageously, such a gearbox may be designed according to the requested rate and power.

[0040] According to some embodiments, the actuator is configured for manual operation of the friction element.

[0041] Advantageously, a manually operable actuator establishes a choice of motor operated and/or manually operated headrest, depending on a position of the operator relative to the actuator. In addition, a cable-based transmission means is especially easy to operate manually.

[0042] According to a second aspect, a seat comprises a headrest according to various embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] Embodiments of the invention will be described with reference to the accompanying drawings, in which the same or similar reference numerals designate the same or similar elements.

Figs. 1 and 1B are schematic perspective views of a headrest according to prior art.

Figs. 2A, 2B and 2C are schematic perspective views of a headrest according to an embodiment.

Fig. 3 is a schematic perspective view of a seat com-

prising a headrest according to various embodiments.

DETAILED DESCRIPTION OF EMBODIMENTS

[0044] Exemplary embodiments of the invention will now be described with reference to the drawings. While some embodiments will be described in the context of specific fields of application, the embodiments are not limited to this field of application. Further, the features of the various embodiments may be combined with each other unless specifically stated otherwise.

[0045] The drawings are to be regarded as being schematic representations and elements illustrated in the drawings are not necessarily shown to scale. Rather, the various elements are represented such that their function and general purpose become apparent to a person skilled in the art.

[0046] Figs. 1A and 1B are schematic perspective views of a headrest 10 according to prior art.

[0047] The headrest 10 is for a seat 40, and comprises a headrest support frame 11 acting as a support for a headrest cushion (not shown), an actuator 12 and a transmission means 13-15.

[0048] A lower end of the headrest support frame 11 is pivotably connected to an upper end of a backrest 16 of the seat 40 so as to enable a pivotal motion of the headrest 10 relative to the backrest 16 around an axis AX extending in a transverse direction of the headrest support frame 11.

[0049] The actuator 12, which includes an electrical drive, is connected to the seat 40 and configured to actuate the headrest support frame 11 via the transmission means 13-15.

[0050] The transmission means 13-15 is a linkage comprising a rod 13, a lower link 14 and an upper link 15, and mechanically interconnects the actuator 12 and the headrest support frame 11 as follows.

[0051] A lower end of the rod 13 is connected to the actuator 12, which imparts a pushing or pulling force or motion to the rod 13 when operated.

[0052] A lower end of the lower link 14 is pivotably connected to the backrest 16 at a pivot 17. The lower link 14 comprises an actuation projection 18 extending in substantially perpendicular direction from the lower link 14 at pivot 17.

[0053] An upper end of the rod 13 is pivotably connected via the actuation projection 18 to a lower end of the lower link 14, so as to impart the pushing or pulling force or motion of the rod 13 to a pivotal force or motion of the lower link 14.

[0054] An upper end of the upper link 15 is pivotably connected to the headrest support frame 11.

[0055] The upper and lower links 15, 14 are pivotably interconnected so as to transmit the pivotal force or motion of the lower link 14 via the upper link 15 to the headrest support frame 11, and to the headrest 10 accordingly.

[0056] Figs. 1A and 1B further illustrate a biasing means 30, which is a spring 30 arranged at a pivot of the headrest support frame 11 relative to the backrest 16, and which may bias a pivotal motion of the headrest 10 relative to the backrest 16.

[0057] Figs. 2A, 2B and 2C are schematic perspective views of a headrest 20 according to an embodiment.

[0058] The headrest 20 is for a seat 40, and comprises a headrest support frame 21 for a headrest cushion (not shown), an actuator 22 and a transmission means 23-28.

[0059] A lower end of the headrest support frame 21 is pivotably connected to an upper end of a backrest 41 of the seat 40 so as to enable a pivotal motion of the headrest 20 relative to the backrest 41 around an axis AX extending in a transverse direction of the headrest support frame 21.

[0060] The actuator 22 is connected to the seat 40 and may actuate the headrest support frame 21 when operated.

[0061] The transmission means 23-28 mechanically interconnects the actuator 22 and the headrest support frame 21, and comprises a cable 23. The cable 23 exerts, via the transmission means 23-28, a tension on the headrest support frame 21 in both directions of the pivotal motion so as to adjust a pivotal position of the headrest 20 and to hold the headrest 20 in the pivotal position if not actuated. For example, the headrest support frame 21 is stably held in the two different pivotal positions illustrated in Figs. 2A and 2B.

[0062] The transmission means 23-28 further comprises a linkage 25, 26. The cable 23 is configured to transform a rotary motion of the actuator 22 to a pivotal motion of the linkage 25, 26, and the linkage 25, 26 is configured to transmit its pivotal motion to the headrest support frame 21.

[0063] The actuator 22 comprises a friction element, in particular a pulley (included in gearbox 22a) providing the rotary motion, and the cable 23 is configured to circumferentially engage a periphery of the friction element so as to accommodate the rotary motion and transform it to a pulling motion.

[0064] The linkage 25, 26 comprises an upper link 25 and a lower link 26. An upper end of the upper link 25 is pivotably connected to the headrest support frame 21, and a lower end of the lower link 26 is pivotably connected to the backrest 41 at a pivot 29. Furthermore, the upper and lower links 25, 26 are pivotably interconnected, so as to transmit a pivotal motion of the lower link 26 via the upper link 25 to the headrest 20.

[0065] The lower link 26 comprises forward and rearward actuation projections 27, 28. The projections 27, 28 extend from the pivot 29 in substantially opposing relation to each other and are connected to opposing ends of the cable 23, so as to transform the rotary motion of the actuator 22 to the pivotal motion of the lower link 26.

[0066] The cable 23 is a Bowden cable 23, 24 comprising an outer tube 24 and an inner cable 23. Ends of the inner cable 23 are connected to the forward and rearward actuation projections 27, 28, and ends of the outer

tube 24 are connected to the backrest 41 proximate to the lower link 26.

[0067] The inner cable 23 is made of steel.

[0068] The headrest 20 may further comprise a biasing means 30 as shown in Figs. 1A and 1B, respectively. Such a biasing means 30 may bias a pivotal motion of the headrest 20 relative to the backrest 41. The biasing means 30 shown in Figs. 1A and 1B is a spring 30 arranged at a pivot of the headrest support frame 21 relative to the backrest 41.

[0069] Fig. 3 is a schematic perspective view of a seat 40 comprising a headrest 20 according to various embodiments.

[0070] Fig. 3 shows the headrest support frame 21 being pivotably connected to the backrest 41 of the seat 40 so as to enable a pivotal motion of the headrest 20 relative to the backrest 41 around an axis AX extending in a transverse direction of the headrest support frame 21.

[0071] The actuator 22 illustrated in Figs. 2A, 2B, 2C and 3 is configured for manual operation of the friction element. Alternatively, the actuator 22 may comprise an electrical drive 22b and a gearbox 22a to actuate the friction element, in a modified configuration with respect to the example of Figs. 1A and 1B.

[0072] The gearbox 22a may, for example, be made of plastic.

REFERENCE SIGNS

[0073]

AX	Pivot axis
10	Headrest (prior art)
11	Headrest support frame
12	Actuator, electric drive
13	Rod
14	Upper link
15	Lower link
20	Headrest
21	Headrest support frame
22	Actuator
22a	Gearbox
22b	Electrical drive
23	Inner cable
24	Outer tube
23, 24	Cable, Bowden cable
25	Upper link
26	Lower link
25, 26	Linkage
27	Forward actuation projection
28	Rearward actuation projection
23-28	Transmission means
29	Pivot
30	Biasing means, spring
40	Seat
41	Seat back

Claims

1. A headrest (20) for a seat (40), comprising

a headrest support frame (21), a lower end thereof being pivotably connectable to an upper end of a backrest (41) of the seat (40) so as to enable a pivotal motion of the headrest (20) relative to the backrest (41) around an axis (AX) extending in a transverse direction of the headrest support frame (21),
an actuator (22) being connectable to the seat (40) and configured to actuate the headrest support frame (21),
a transmission means (23-28) mechanically interconnecting the actuator (22) and the headrest support frame (21),

characterized in that
the transmission means (23-28) comprises a cable (23) exerting a tension on the headrest support frame (21) in both directions of the pivotal motion so as to adjust a pivotal position of the headrest (20) if the actuator (22) is actuated and to hold the headrest (20) in the pivotal position if the actuator (22) is not actuated.

2. The headrest (20) of claim 1, wherein

the transmission means (23-28) further comprises a linkage (25, 26),
the cable (23) is configured to transform a rotary motion of the actuator (22) to a pivotal motion of the linkage (25, 26), and
the linkage (25, 26) is configured to transmit its pivotal motion to the headrest support frame (21).

3. The headrest (20) of claim 2, wherein
the actuator (22) comprises a friction element providing the rotary motion, and the cable (23) is configured to circumferentially engage a periphery of the friction element so as to accomodate the rotary motion.

4. The headrest (20) of claim 2 or claim 3, wherein the linkage (25, 26) comprises

an upper link (25), an upper end thereof being pivotably connected to the headrest support frame (21), and
a lower link (26), a lower end thereof being pivotably connectable to the backrest (41) at a pivot (29),
the upper and lower links (25, 26) are pivotably interconnected, so as to transmit a pivotal motion of the lower link (26) via the upper link (25) to the headrest (20).

5. The headrest (20) of claim 4, wherein
the lower link (26) comprises forward and rearward actuation projections (27, 28)

extending from the pivot (29) in substantially opposing relation to each other and
being connected to opposing ends of the cable (23),

so as to transform the rotary motion of the actuator (22) to the pivotal motion of the lower link (26).

6. The headrest (20) of any one of claims 2 - 5, wherein

the cable (23) is a Bowden cable (23, 24) comprising an outer tube (24) and an inner cable (23),
ends of the inner cable (23) are connected to the forward and rearward actuation projections (27, 28), and
ends of the outer tube (24) are connected to the backrest (41) proximate to the lower link (26).

7. The headrest (20) of claim 6, wherein
the inner cable (23) is made of steel.

8. The headrest (20) of any one of claims 1 - 8, further comprising
a biasing means (30) being configured to bias a pivotal motion of the headrest (20) relative to the backrest (41).

9. The headrest (20) of claim 8, wherein
the biasing means (30) is a spring (30) arranged at a pivot of the headrest support frame (21) relative to the backrest (41).

10. The headrest (20) of any one of claims 3 - 9, wherein
the actuator (22) comprises an electrical drive (22b) and a gearbox (22a) being configured to actuate the friction element.

11. The headrest (20) of claim 10, wherein
the gearbox (22a) is made of plastic.

12. The headrest (20) of any one of claims 3 - 9, wherein
the actuator (22) is configured for manual operation of the friction element.

13. A seat (40), comprising
the headrest (20) of any one of claims 1 - 12.

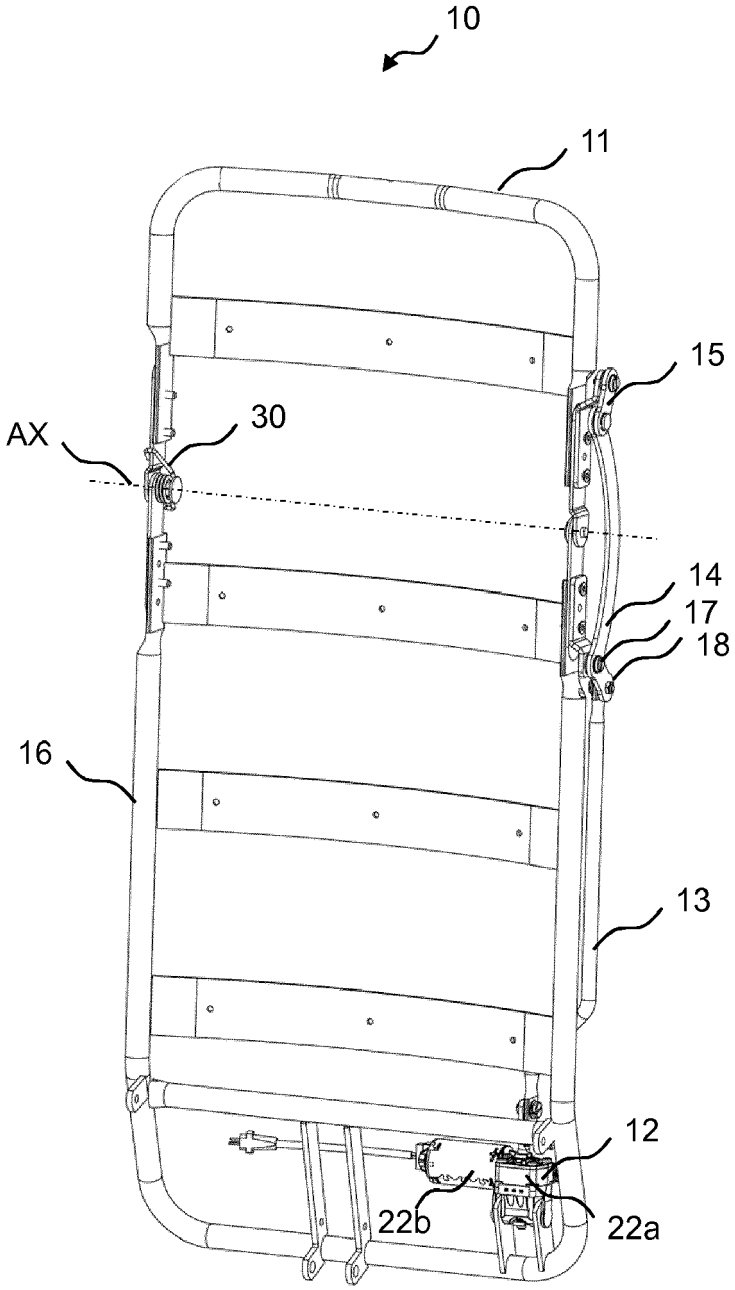

Fig. 1A (Prior Art)

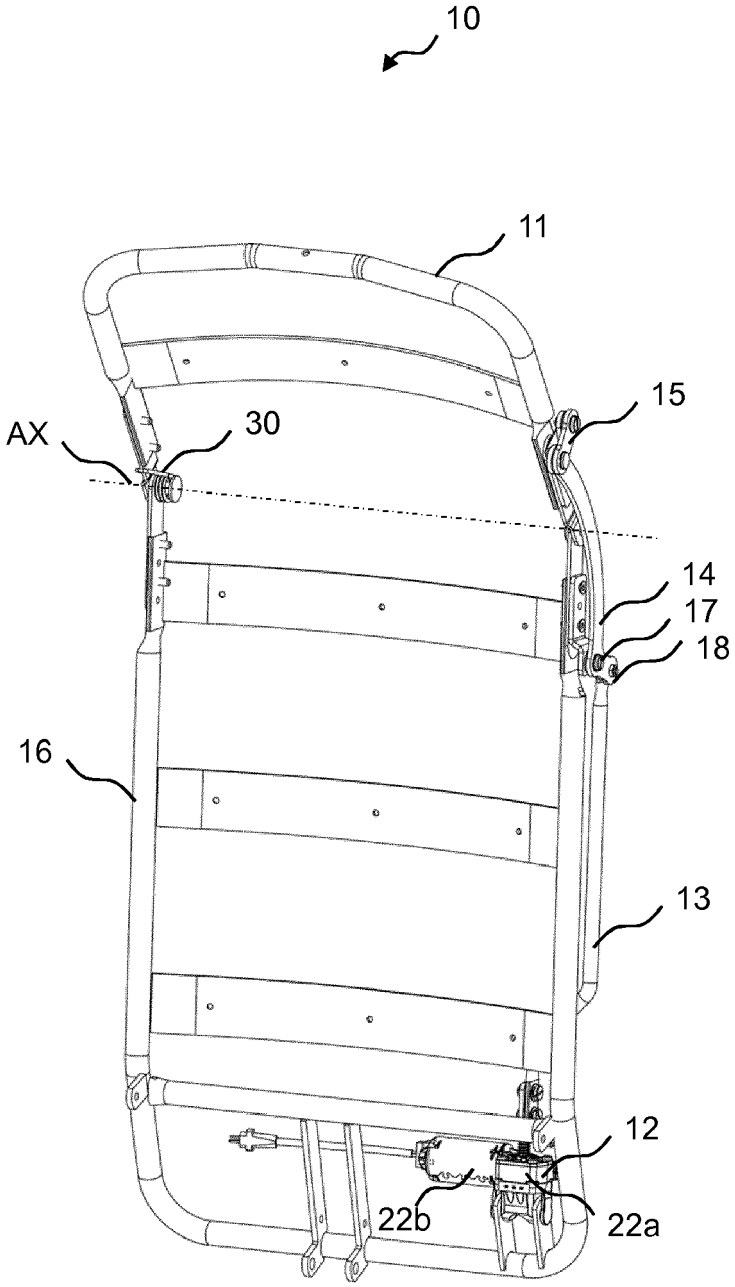

Fig. 1B (Prior Art)

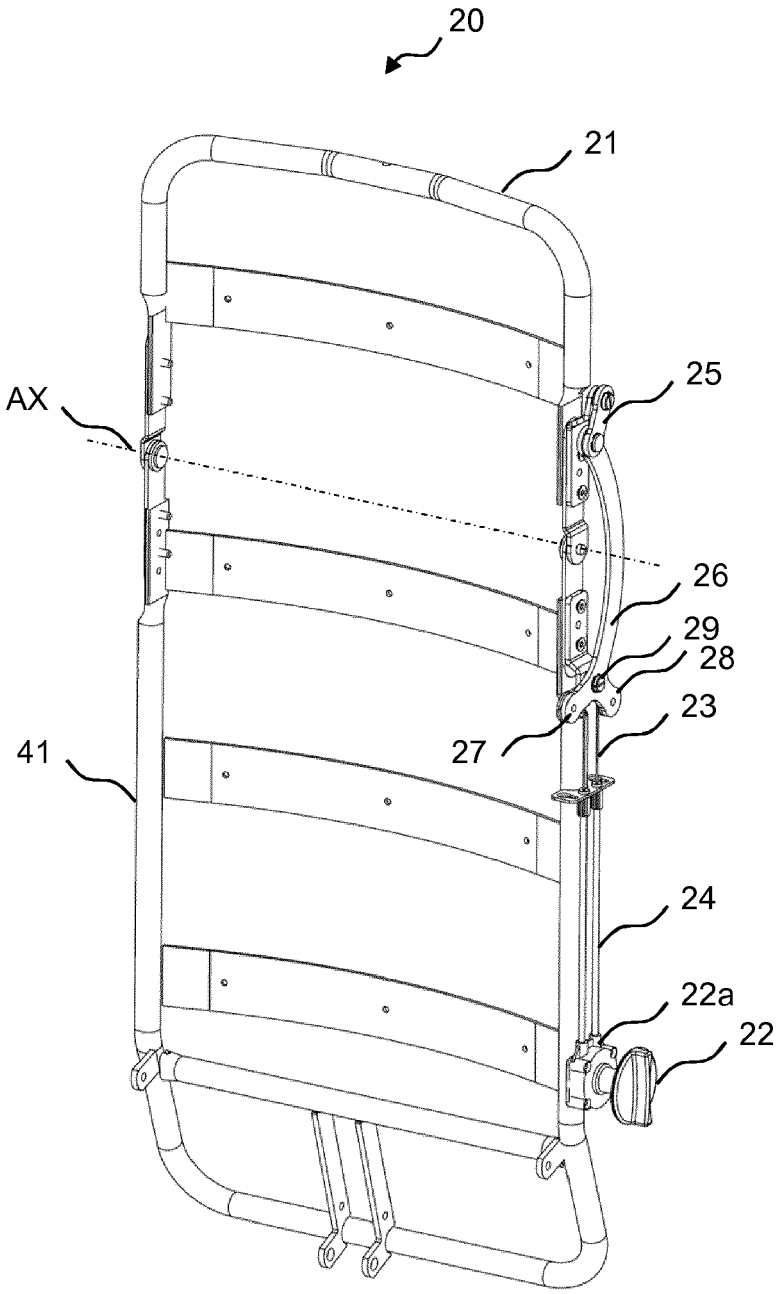

Fig. 2A

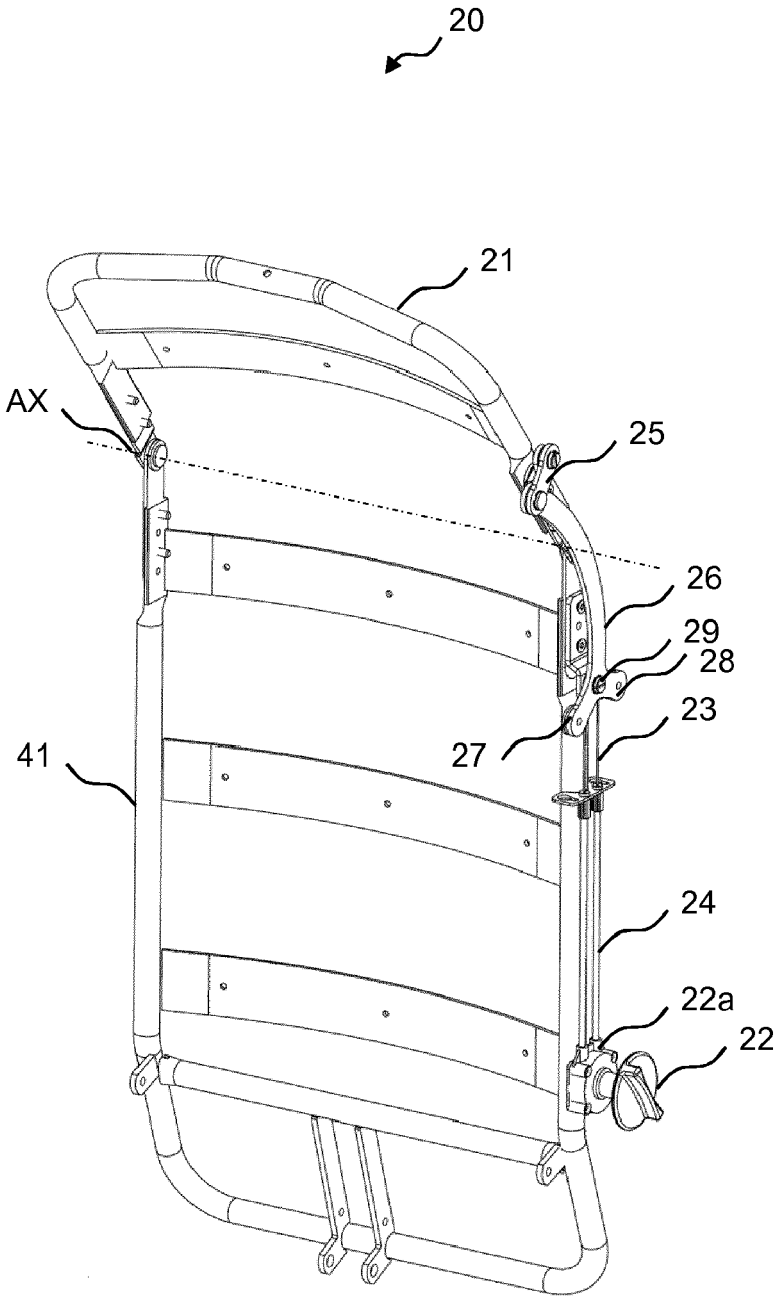

Fig. 2B

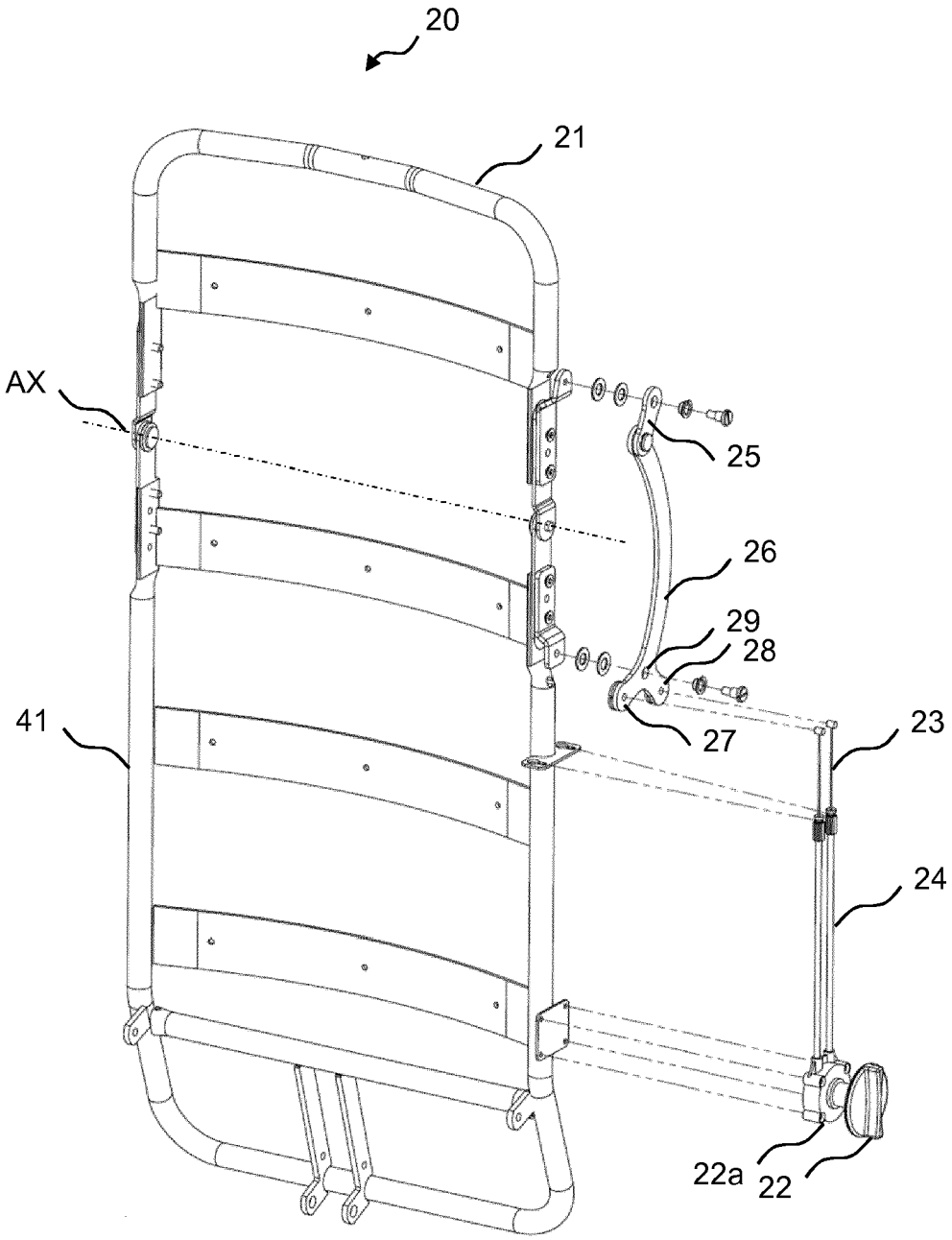

Fig. 2C

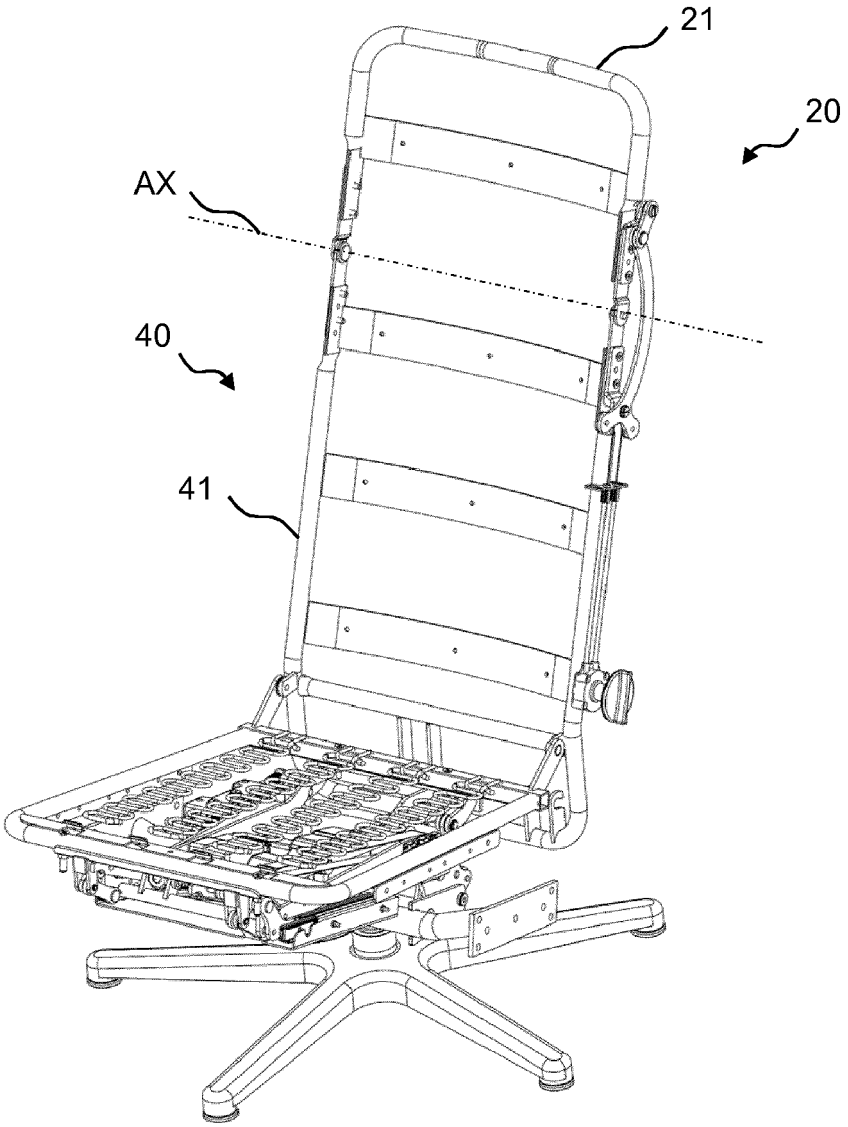

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 18 15 0786

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC) A47C B60N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 June 2018	Kus, Slawomir

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82