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(54) Title: SEAT ASSEMBLY FOR A VEHICLE

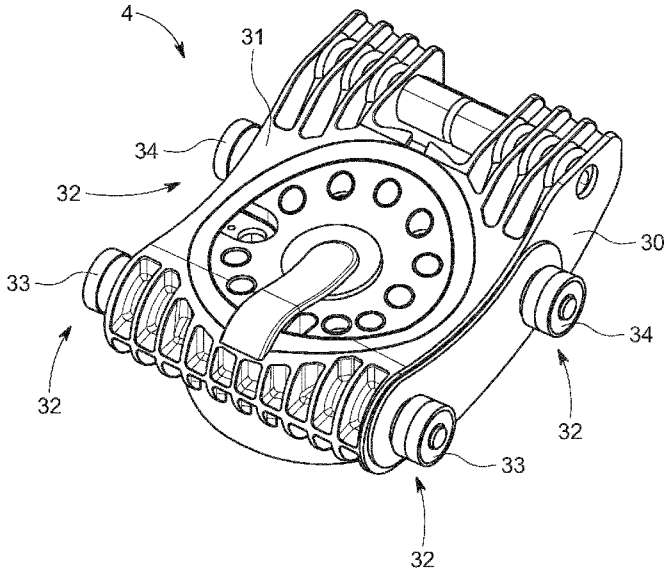


FIG. 3

(57) Abstract: Aspects of the present invention relate to a seat assembly for a vehicle. The seat assembly comprises a seat frame comprising first and second facing side frame members spaced from each other, and a seat frame support mountable to the vehicle. The seat frame and the seat frame support are configured such that, when the seat frame is mounted to the seat frame support, the seat frame support is received in a space between the first and second facing side frame members, and the seat frame is rotatable relative to the seat frame support about a virtual pivot axis spaced from the seat frame. Another aspect of the present invention relates to a vehicle comprising a seat assembly.

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SEAT ASSEMBLY FOR A VEHICLE

TECHNICAL FIELD

The present disclosure relates to a seat assembly for a vehicle. Aspects of the invention relate to a vehicle comprising the seat assembly.

BACKGROUND

Seats are an essential comfort feature of a vehicle. It is known to provide conventional vehicle seats which are adjustable in multiple different ways to enhance an occupant's comfort. Conventional vehicle seats comprise a squab, back support, and cushion. It is known to provide a reclining function in a conventional vehicle seat by the inclusion of a mechanism which allows the angle between the squab and back support to be adjusted.

The pivot position for such a conventional vehicle seat is at the join between the squab and back support. Therefore, the pivot point is not in line with the hip point of a seated occupant which is located higher up than the pivot point and further forwards in the vehicle.

It is desirable to maintain a datum position of a seated occupant as a seat is reclined or otherwise adjusted. This datum, known as the Seating Reference Point (SRP) is an imaginary point in space centred at the occupant's effective hip point and is known and used by vehicle manufacturers and other industry groups to express various seating measurements and characteristics such as leg room, that are pertinent to seating comfort, vehicle entry and exit, restraint design, collision performance and the occupant's visibility from the vehicle. However, when a conventional vehicle seat is adjusted to recline the back support, the hip point of the occupant moves. Often, this movement results in the occupant's hip point lying spaced from the SRP.

It is an aim of the present invention to address one or more of the disadvantages associated with the prior art.

SUMMARY OF THE INVENTION

Aspects and embodiments of the invention provide a seat assembly, and a vehicle comprising the seat assembly as claimed in the appended claims.

According to an aspect of the present invention there is provided a seat assembly for a vehicle, the seat assembly comprising a seat frame comprising first and second facing side frame members spaced from each other, and a seat frame support mountable to the vehicle, wherein

the seat frame and the seat frame support are configured such that, when the seat frame is mounted to the seat frame support, the seat frame support is received in a space between the first and second facing side frame members, and the seat frame is rotatable relative to the seat frame support about a virtual pivot axis spaced from the seat frame.

Advantageously, the assembly allows the seat frame to be rotated through a large range of motion providing inclined and reclined positions for an occupant without moving an occupant's hip point away from the seat reference position. This may provide benefit to the calibration of seat comfort and control positioning. In addition, this may further enable a more predictable SGRP for associated safety systems.

Each of said first and second side frame members may comprise arcuate slots spaced from each other in an angular direction about said virtual pivot axis.

Advantageously, the arcuate slots allow a smooth rotation of the seat frame relative to the seat frame support. The radius of curvature of the slots can also be chosen to define the virtual pivot axis so that it can be placed in the desired location. In addition, the arcuate slots can limit the range of movement of the seat frame.

The seat frame support may comprise a body and followers extending laterally from opposite sides of the body, each follower being configured to locate in a corresponding one of the arcuate slots in the first and second side frame members when the seat frame is mounted to the seat frame support.

Each follower may comprise a bearing assembly.

Each bearing assembly may comprise an inner bearing adjacent to said body and outer bearing spaced from said body by said inner bearing, said inner and outer bearings being mounted on a bearing shaft extending from the body for rotation about a longitudinal axis.

Each arcuate slot in the first and second side frame members may comprise laterally inner and outer bearing surfaces configured so that the seat frame is supported on the inner bearing via the inner bearing surface and on the outer bearing via the outer bearing surface.

The inner and outer bearing surfaces may be on diametrically opposite sides of the longitudinal axis of the bearing shaft.

Advantageously, the arrangement of the bearing assembly and bearing surfaces provide the seat frame with support in both vertical directions so that the seat does not move vertically relative to the seat frame support whilst still allowing the seat frame to be rotated relative to the seat frame support. This reduces free play between the seat frame and the seat frame support during travel without limiting the rotational degree of movement

The inner bearing surface may be formed on an upper surface of the arcuate slot, said upper surface being closer to the virtual pivot axis than the outer bearing surface, and wherein the outer bearing surface is formed on a lower surface of the arcuate slot.

The inner bearing may have a smaller diameter than the outer bearing.

Advantageously, the difference in the diameter of the bearings ensures that only one bearing can contact one bearing surface in order to support the seat frame in the vertical direction from above and below. This allows the bearings to rotate in opposite directions along their respective surface without preventing rotation of the seat frame relative to the seat frame support.

The bearing shaft may comprise a spigot for removably attaching the bearing assembly to the body with the inner and outer bearings received in the arcuate slot.

Removably attachable bearing shafts can be replaced easily and allow the seat frame to be removably mounted to the seat frame support. That is, attaching the bearing assembly to the seat frame support through the arcuate slots mounts the seat frame to the seat frame support.

The seat assembly may further comprise a drive mechanism mounted in the seat frame between said first and second facing side frame members, the drive mechanism being operable to pivot the seat frame about the virtual pivot axis.

Advantageously, the drive mechanism can be kept within the seat assembly in order to save space in a vehicle.

The drive mechanism may comprise a drive shaft having one end connected to the body, the drive shaft extending from the body through a drive member such that, upon rotation of the drive member, the length of the drive shaft between the body and the drive member is changed to pivot the seat frame relative to the body about the virtual pivot axis.

Therefore, the seat frame can be moved relative to the seat frame support automatically or at least with minimal effort from an occupant.

The drive mechanism may include a motor.

The virtual pivot axis may be co-incident with a seat reference point.

Advantageously, the occupant's hip point will not move from the seat reference point in any inclined or reclined position of the seat frame relative to the seat frame support.

According to another aspect of the invention, there is provided a vehicle comprising a seat assembly according to the invention.

Within the scope of this application it is expressly intended that the various aspects, embodiments, examples and alternatives set out in the preceding paragraphs, in the claims and/or in the following description and drawings, and in particular the individual features thereof, may be taken independently or in any combination. That is, all embodiments and/or features of any embodiment can be combined in any way and/or combination, unless such features are incompatible. The applicant reserves the right to change any originally filed claim or file any new claim accordingly, including the right to amend any originally filed claim to depend from and/or incorporate any feature of any other claim although not originally claimed in that manner.

BRIEF DESCRIPTION OF THE DRAWINGS

One or more embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a schematic perspective view of a seat assembly for a vehicle comprising a seat frame and a seat frame support according to the present invention;

Figure 2 shows a schematic perspective view of the seat frame of the seat assembly shown in Figure 1;

Figure 3 shows a schematic perspective view of the seat frame support of the seat assembly shown in Figure 1;

Figure 4 shows a schematic cross-section frontal view of the seat frame support shown in Figure 3 showing a bearing assembly;

Figure 5 shows a vehicle in accordance with an embodiment of the invention.

DETAILED DESCRIPTION

A seat assembly 1 for a vehicle 2 in accordance with an embodiment of the present invention is described herein with reference to the accompanying Figure 1.

With reference to Figure 1, there is shown a seat assembly 1 for a vehicle 2, shown in Figure 5. The seat assembly 1 comprises a seat frame 3, also shown in Figure 2, and a seat frame support or pedestal 4, also shown in Figure 3, which is mountable to the vehicle 2. The seat frame 3 comprises a first side frame member 6 and a second frame side member 7, shown in Figure 2. The first and second side frame members 6, 7 faces each other and are spaced apart from each other. The seat frame 3 and the seat frame support 4 are configured such that, when the seat frame 3 is mounted to the seat frame support 4, the seat frame support 4 is received in a space 8 between the first and second facing side frame members 6, 7. The seat frame 3 is rotatable relative to the seat frame support 4 about a virtual pivot axis A. The virtual pivot axis A is spaced from the seat frame 3. The virtual pivot axis A is co-incident with the Seat Reference Point R, or is spaced from the Seat Reference Point R by a distance which is less than a predetermined acceptable tolerance.

In the present embodiment shown in Figure 1, the seat assembly 1 is mounted to the cabin floor of a vehicle 2, shown in Figure 5, via a vehicle seat support 10 which is slideable mounted on a vehicle seat platform 11. The vehicle seat platform 11 is mountable to the cabin floor such that it forms a part of or supports the cabin floor. The vehicle seat support 10 may comprise an orientation mechanism 12 which allows the seat assembly 1 to be rotated around a vertical axis and/or moved vertically relative to the cabin floor of the vehicle 2. In other embodiments, the seat assembly 1 may be mounted directly to the cabin floor of the vehicle 2 such that it is fixed or so that it can only rotate around a vertical axis and/or moved vertically relative to the cabin floor of the vehicle 2.

Referring to Figure 2, the first and second side frame members 6, 7 each comprise a bottom section 15a, 15b and a back section 16a, 16b. The bottom sections 15a, 15b are configured to support the weight of an occupant, especially when the seat frame 3 is in a neutral position.

The back sections 16a, 16b are configured to support the back of an occupant leaning back in their seat and when the seat frame 3 is in a reclined position.

In the present embodiment, the bottom sections 15a, 15b and back sections 16a, 16b are joined by hip sections 17a, 17b. The hip sections 17a, 17b may be arcuate as shown in Figure 2. The bottom, back, and hip sections 15a, 16a, 17a of the first side frame member 6 and the bottom 15b, 16b, 17b of the second side frame member 7 are integral. In some embodiments, the sections may be fixed together. The seat frame 3 further comprises at least one cross beam element 18. The at least one cross beam element 18 is configured to space the first and second side frame members 6, 7.

Referring to Figures 1 and 2, each of the first and second side frame members 6, 7 comprise at least one arcuate slot 20. The slots 20 extend from an inner surface of the side frame members 6, 7 towards an outer surface of the side frame members 6, 7. However, as illustrated in Figure 2, the slots 20 might not extend fully through the side frame members 6, 7 in a lateral direction.

In the present embodiment, the first and second side frame members 6, 7 comprise a first arcuate slot 21 and a second arcuate slot 22, which can be seen in the first side member 6 in Figure 1 and in the second side member 7 in Figure 2. The first and second arcuate slots 21, 22 are spaced from each other. The first and second arcuate slots 21, 22 are preferably spaced from each other in an angular direction about the virtual pivot axis A. That is, the radius of curvature of each of the first and second slots 21, 22 are the same and centred on the virtual pivot axis A but separated by an angular distance.

In the present embodiment, the virtual pivot axis A is co-incident with a seat reference point R. Therefore, when the seat frame 3 is rotated relative to the seat frame support 4, the hip point of an occupant stays in the same place and does not move outside of the tolerance range. This provides a seat assembly which is safe in all possible inclinations of the seat frame 3.

In an alternative embodiment, the radius of curvature of each of the slots 21, 22 may be different or the radius of curvature of each of the slots 21, 22 may be centred on different virtual pivot axes. In another alternative embodiment, the number of slots 20 on the side frame members 6, 7 may differ. For example, each side frame member 6, 7 may comprise a single arcuate slot 20, or each side member 6, 7 may comprise more than two arcuate slots. In a

further alternative embodiment, the number of slots 20 on the first side frame member 6 may be different to the number of slots 20 on the second side frame member 7.

As illustrated in Figures 1 and 2, the slots 21, 22 maybe formed in a housing 23 which is attached to the seat frame 3. However, in some embodiments, the housing 23 which comprises the slots 21, 22 may be integrally formed with the side frame members 6, 7.

In the present embodiment, each arcuate slot 21, 22 of the first and second side frame members 6, 7 comprises an inner bearing surface 25 and an outer bearing surface 26, as shown in Figures 1 and 4. The inner bearing surface 25 is laterally inside the outer bearing surface 26. That is, the inner bearing surfaces 25 of the first and second side frame members 6, 7 are closer together than the outer bearing surfaces 26 of the first and second side frame members 6, 7. The inner and outer bearing surfaces 25, 26 are configured so that the seat frame 3 is supported by the seat frame support 4, as will be described in more detail hereinafter.

Referring now to Figure 4, a schematic front cross-sectional view of the first slot 21 in the first side frame member 6 is shown. As illustrated in the embodiment depicted in Figure 4, the inner bearing surface 25 is formed on an upper surface 27 of the first arcuate slot 21. The outer bearing surface 26 is formed on a lower surface 28 of the first arcuate slot 21. Each of the slots 21, 22 in the side frame members 6, 7 have a similar construction. The upper surface 27 of the arcuate slot 21 is closer to the virtual pivot axis A than the lower surface 28 of the arcuate slot 21. That is, the upper surface 27 has a smaller radius of curvature than the lower surface 28.

Referring back to Figure 3, the seat frame support 4 according to the invention is shown. The seat frame support 4 comprises a body 30. The body 30 of the seat frame support 4 is configured to be received between the first and second side frame members 6, 7; especially between the bottom sections 11a, 11b of the side frame members 6, 7. The body 30 comprises a top surface 31 which is configured to have the same profile as a bottom surface of a cushion (not shown) to be mounted to the seat frame 3, shown in Figure 2. The top surface 31 having the same profile as the bottom surface of the cushion facilitates rotation of the seat frame 3 relative to the seat frame support 4.

The seat frame support 4 further comprises a plurality of followers 32. The followers 32 extend laterally from the body 30 of the seat frame support 4. Followers 32 extend from opposing sides of the body 30. Each follower 32 is configured to locate in a corresponding one of the

arcuate slots 20 in the first and second side frame members 6, 7 when the seat frame 3 is mounted to the seat frame support 4.

In the present embodiment, the plurality of followers comprises a first follower 33 and a second follower 34 on each side of the body 30. As illustrated in Figure 1, which shows the configuration of the first side frame member 6 only, the first follower 33 is located in the first arcuate slot 21 and the second follower 34 is located in the second arcuate slot 22. The range of movement of the seat frame, i.e., the angle of inclination and reclining achievable by the seat frame 3, is determined by the position of the slots 20 in the side frame members 6, 7, the length of the arcuate slots 21, 22, and the distance between the followers 32.

However, in alternative embodiments, there may be more than one follower 32 in a slot 20. For example, in an embodiment in which each of the first and second side frame members 6, 7 comprise a single slot 20 each, at least a first follower 33 and a second follower 34 may be located in each single slot 20.

Referring back to Figure 4, the followers 32 of the present invention comprise a bearing assembly 35. Each of the bearing assemblies 35 comprise an inner bearing 36 and an outer bearing 37. The inner bearing 36 is located adjacent to the body 30 of the seat frame support 4. The outer bearing 37 is spaced from the body 30 of the seat frame support 4 by the inner bearing 36. Each of the bearing assemblies 35 further comprise a bearing shaft 38 having a longitudinal axis. The bearing shaft 38 extends from the body 30 of the seat frame support 4 such that its longitudinal axis extends laterally from the body 30. Both the inner and outer bearings 36, 37 are mounted on the bearing shaft 38 and configured to rotate about the longitudinal axis of the bearing shaft 38.

In some embodiments, each bearing shaft 38 comprises a spigot 39. The spigot 39 is configured to removably attach the bearing assembly 35 to the body 30 of the seat frame support 4 with the inner and outer bearings 36, 37 received in the arcuate slot 21. Therefore, the arcuate slots 21, 22 in the housing 23 or in the seat frame 3 can be aligned with the body 30 of the seat frame support 4, specifically with the holes (not shown) configured to receive the spigots 39, and the bearing assembly 35 can be attached to the body 30 of the seat frame support 4 by moving each bearing assembly 35 laterally inward until the spigot 39 is attached to the body 30 to mount the seat frame 3 to the seat frame support 4.

The inner bearing 36 of each bearing assembly 35 is configured so that it contacts the inner bearing surface 25 of the arcuate slot 21. The outer bearing 37 of each bearing assembly 35

is configured so that it contacts the outer bearing surface 26 of the arcuate slot 21. That is, the inner and outer bearing surfaces 26, 27 are configured so that the seat frame 3 is supported on the inner bearing 36 via the inner bearing surface 25 and the outer bearing 37 via the outer bearing surface 26. As shown in Figure 4, the inner and outer bearing surfaces 25, 26 are on diametrically opposed sides of the longitudinal axis of the bearing shaft 38.

Each bearing surface 25, 26 has an opposing surface in the radial direction which the bearing assembly 35 does not contact. For example, the inner bearing surface 25 has an opposing lower surface 41. The lower surface 41 is located further from the virtual pivot axis A than the inner bearing surface 25. A first gap 42 exists between the inner bearing 36 and the opposing lower surface 41 such that the inner bearing 36 does not contact the opposing lower surface 41. The outer bearing surface 26 also has an opposing upper surface 43. The upper surface 43 is located closer to the virtual pivot axis A than the outer bearing surface 26. A second gap 44 exists between the outer bearing 37 and the opposing upper surface 43 of the arcuate slot 21 such that the outer bearing 37 does not contact the opposing upper surface 43.

In the present embodiment, the inner bearing 36 has a smaller diameter than the outer bearing 37. The difference between the diameters of the inner and outer bearings 36, 37 may be as little as 0.5 mm. Preferably, the difference in the diameters of the inner and outer bearings 36, 37 is 1 mm. In some embodiments, each bearing 36, 37 may be formed by a standard bearing 46 with different sized sleeves 47 mounted thereupon. Alternatively, only the outer bearing 37 may comprise a sleeve 47.

In the present embodiment, the radial distance between the outer bearing surface 26 and the opposing upper surface 43 is larger than the radial distance between the inner bearing surface 25 and its opposing lower surface 41. This allows the gaps 42, 44 to be formed so that the inner and outer bearings 36, 37 may contra-rotate during rotation of the seat frame 3 relative to the seat frame support 4. That is, whilst the inner bearing rotates clockwise, the outer bearing 37 rotates ant-clockwise, and vice versa.

As shown in Figure 4, the inner bearing surface 25 and the upper surface 43 opposite to the outer bearing surface 26 are offset from one another. Furthermore, the outer bearing surface 26 and the lower surface 41 opposite the inner bearing surface 25 are offset from one another. However, in some embodiments, the lower surface 41 opposite the inner bearing surface 25 may be flush with the outer bearing surface 26.

It will be appreciated that in an alternative embodiment, the inner bearing 36 may have a larger diameter than the outer bearing 37 and the distances between the inner bearing surface 25 and its opposing lower surface 41 and the outer beating surface 26 and its opposing upper surface 43 will be adjusted accordingly. Furthermore, in some embodiments, the inner bearing surface 25 may be formed on the lower surface 28 of the arcuate slot 21 and the outer bearing surface 26 may be formed on the upper surface 26 of the arcuate slot 21.

Referring back to Figure 1, the seat assembly 1 further comprises a drive mechanism 50. The drive mechanism 50 is operable to pivot the seat frame 3 about the seat frame support 4 about the virtual pivot axis. In the present embodiment, the drive mechanism 50 is mounted in the seat frame 3 between the first and second side frame members 6, 7. More specifically, as shown in Figure 1, the drive mechanism 50 may be mounted to a cross beam element 18 extending between the first and second side frame members 6, 7.

The drive mechanism 50 comprises a drive shaft 51. One end 52 of the drive shaft 51 is connected to the body 31 of the seat frame support 4. Preferably, the end 52 of the drive shaft 51 connected to the seat frame support 4 is connected to the rear of the body 31 in a central position.

The drive mechanism 50 further comprises a drive member 53. The drive shaft 51 extends from the body 31 through the drive member 53. The drive shaft 51 is engaged with the drive member 53 such that, upon rotation of the drive member 53. The length of the drive shaft 51 between the body 31 and the drive member 53 is changed to pivot the seat frame 3 relative to the body 31 of the seat frame support 4 about the virtual pivot axis A.

When the drive member 53 rotates such that the length of the drive shaft 51 between the body and the drive member 53 is reduced, the seat frame 3 is rotated relative to the seat frame support 4 about the virtual pivot axis A such that the seat frame is inclined forwards. When the drive member 53 rotates such that the length of the drive shaft 51 between the body and the drive member 53 is increased, the seat frame 3 is rotated relative to the seat frame support 4 about the virtual pivot axis A such that the seat frame 3 is reclined backwards.

In some embodiments, the drive mechanism 50 may comprise a motor 54 configured to rotate the drive shaft 51.

Referring briefly to Figure 5, a vehicle 2 is shown into which the seat assembly may be mounted.

It will be appreciated that various changes and modifications can be made to the present invention without departing from the scope of the present application.

CLAIMS

1. A seat assembly for a vehicle, the seat assembly comprising:

a seat frame comprising first and second facing side frame members spaced from each other, and

a seat frame support mountable to the vehicle,

wherein the seat frame and the seat frame support are configured such that, when the seat frame is mounted to the seat frame support , the seat frame support is received in a space between the first and second facing side frame members , and the seat frame is rotatable relative to the seat frame support about a virtual pivot axis spaced from the seat frame .

2. A seat assembly according to claim 1, wherein each of said first and second side frame members comprise arcuate slots spaced from each other in an angular direction about said virtual pivot axis .

3. The seat assembly according to claim 2, wherein the seat frame support comprises a body and followers extending laterally from opposite sides of the body , each follower being configured to locate in a corresponding one of the arcuate slots in the first and second side frame members when the seat frame is mounted to the seat frame support .

4. The seat assembly according to claim 3, wherein each follower comprises a bearing assembly.

5. The seat assembly according to claim 4, wherein each bearing assembly comprises an inner bearing adjacent to said body and outer bearing spaced from said body by said inner bearing , said inner and outer bearings being mounted on a bearing shaft extending from the body for rotation about a longitudinal axis.

6. The seat assembly according to claim 5, wherein each arcuate slot in the first and second side frame members comprise laterally inner and outer bearing surfaces configured so that the seat frame is supported on the inner bearing via the inner bearing surface and on the outer bearing via the outer bearing surface .

7. The seat assembly according to claim 6, wherein the inner and outer bearing surfaces are on diametrically opposite sides of the longitudinal axis of the bearing shaft.

8. The seat assembly according to claim 7, wherein the inner bearing surface is formed on an upper surface of the arcuate slot , said upper surface being closer to the virtual pivot axis than the outer bearing surface , and wherein the outer bearing surface is formed on a lower surface of the arcuate slot .

9. The seat assembly according to any of claims 6 to 8, wherein the inner bearing has a smaller diameter than the outer bearing.

10. The seat assembly according to any of claims 6 to 9, wherein the bearing shaft comprises a spigot for removably attaching the bearing assembly to the body with the inner and outer bearings received in the arcuate slot.

11. The seat assembly according to any one of the preceding claims, comprising a drive mechanism mounted in the seat frame between said first and second facing side frame members, the drive mechanism being operable to pivot the seat frame about the virtual pivot axis.

12. The seat assembly according to claim 11, wherein the drive mechanism comprises a drive shaft having one end connected to the body , the drive shaft extending from the body through a drive member such that, upon rotation of the drive member , the length of the drive shaft between the body and the drive member is changed to pivot the seat frame relative to the body about the virtual pivot axis .

13. The seat assembly according to claim 12, wherein the drive mechanism includes a motor.

14. The seat assembly according to any one of the preceding claims, wherein the virtual pivot axis is co-incident with a seat reference point.

15. A vehicle comprising a seat assembly according to any one of the preceding claims.

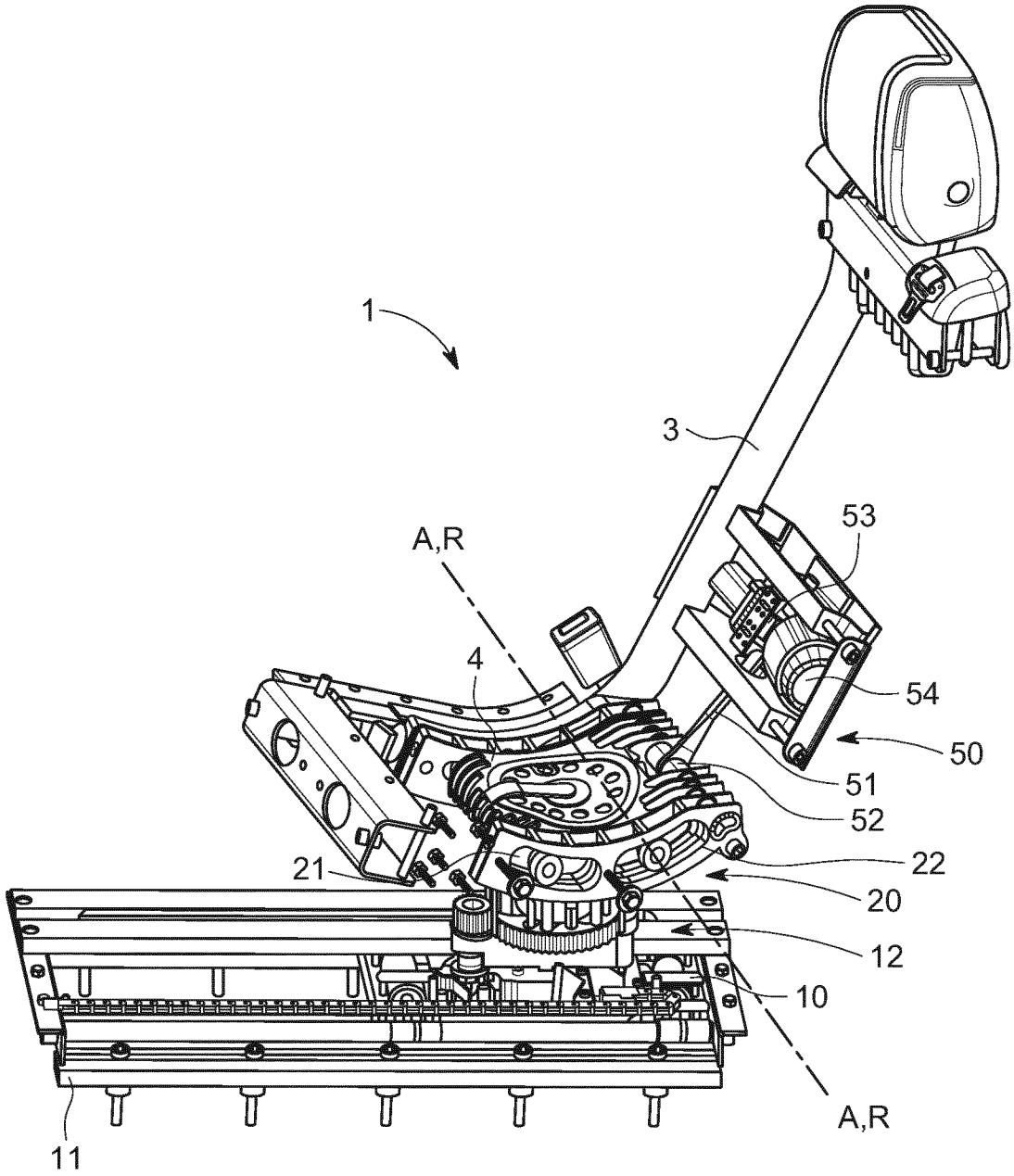


FIG. 1

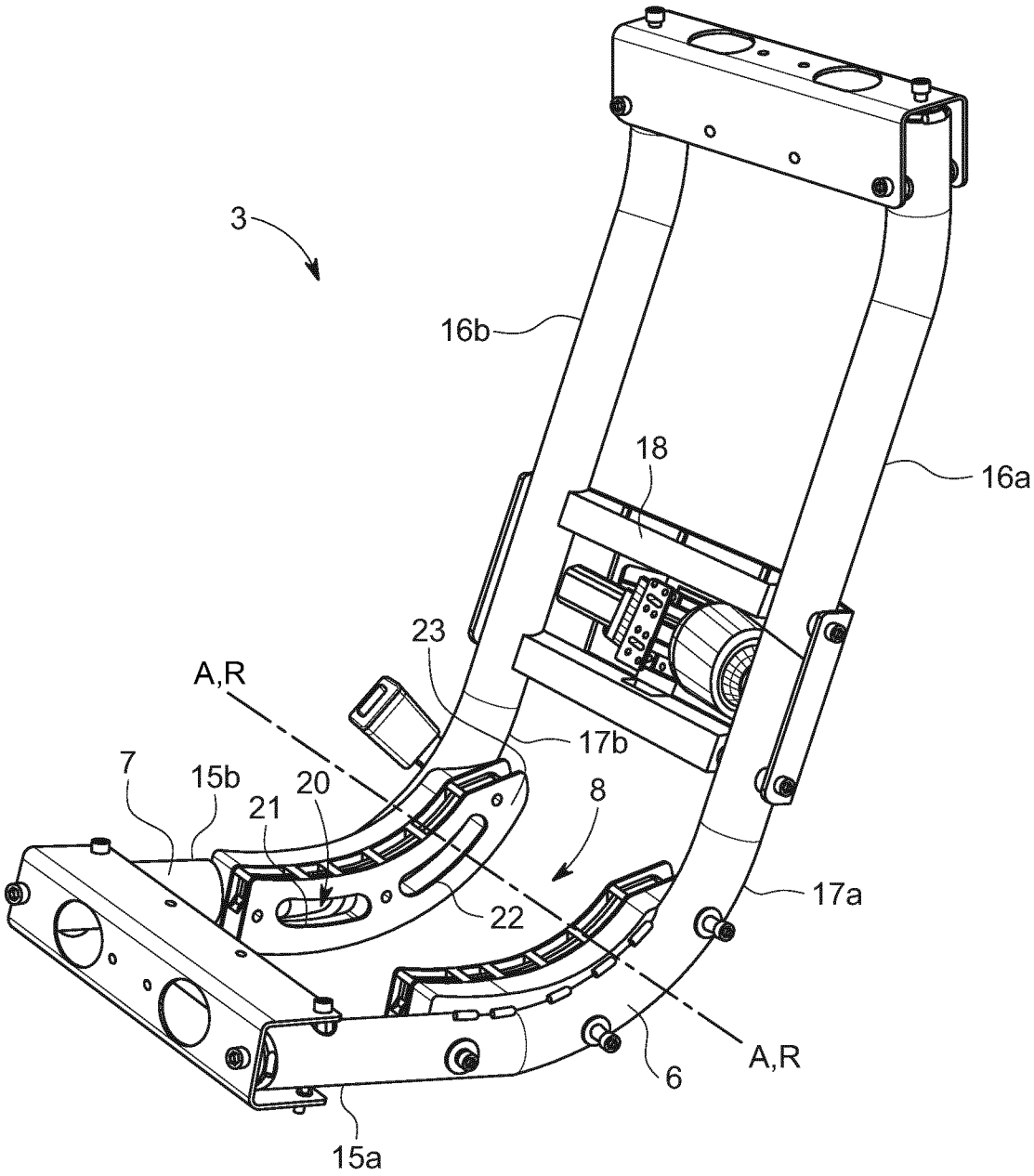


FIG. 2

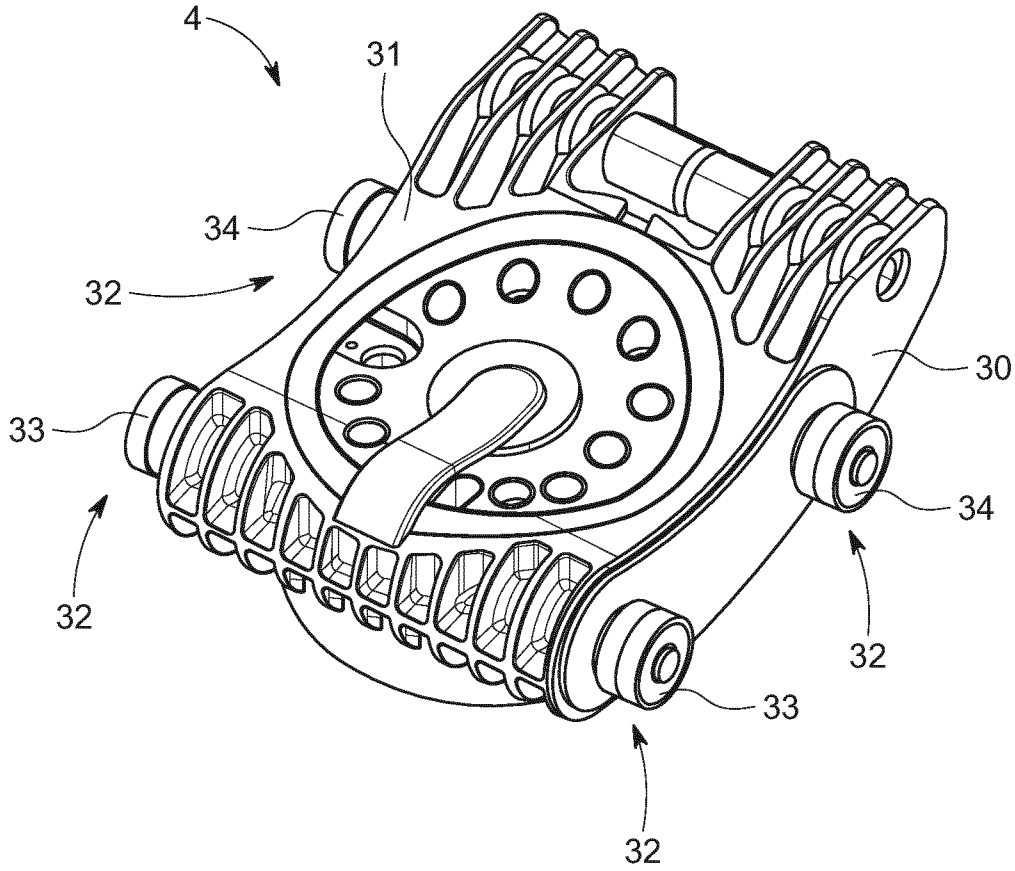


FIG. 3

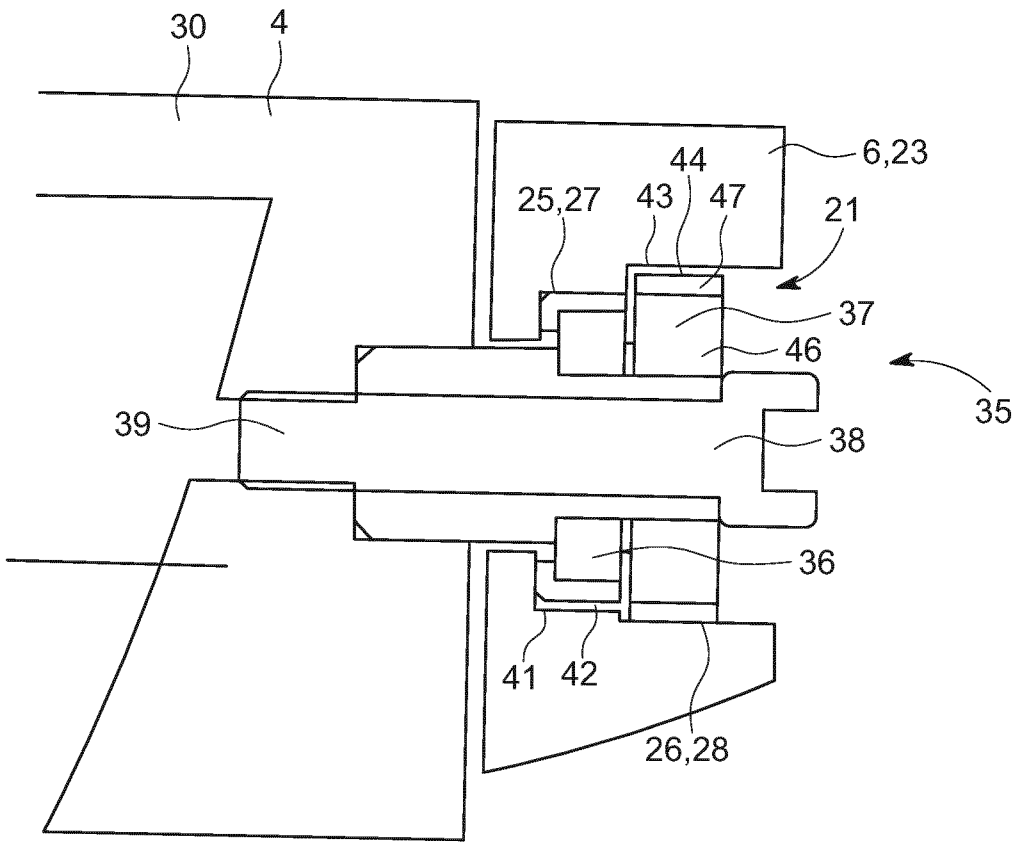


FIG. 4

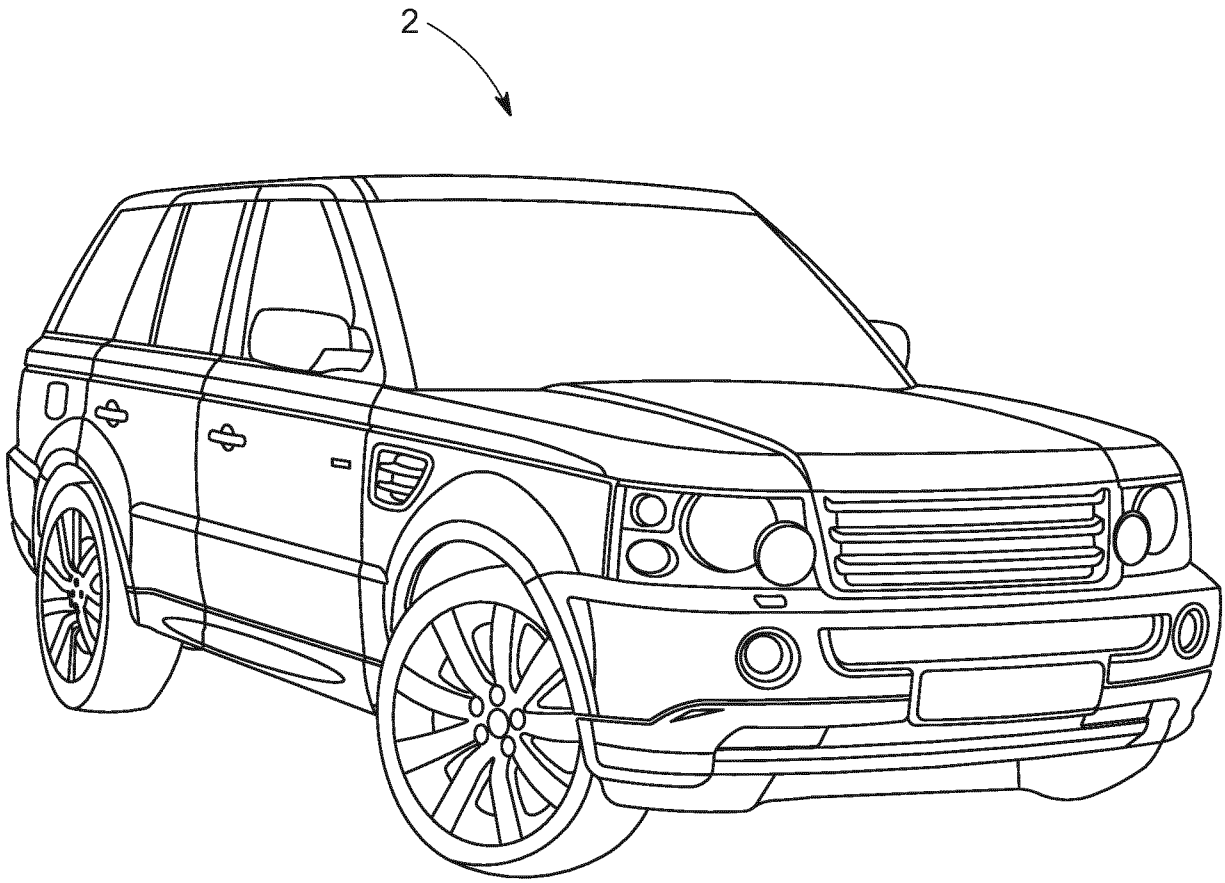


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/078930

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47C3/025 A47C1/034 B60N2/02 B60N2/14
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A47C B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2013 020393 A1 (GENAU MÖBEL GMBH [DE]) 11 June 2015 (2015-06-11)	1-4, 11-15
A	the whole document	5-10

X	US 5 244 252 A (SERBER HECTOR [US]) 14 September 1993 (1993-09-14)	1-4,14, 15
A	the whole document	5-13

X	US 2012/104819 A1 (LINE JOHNATHAN ANDREW [US] ET AL) 3 May 2012 (2012-05-03)	1-4,14, 15
A	the whole document	5-13

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
27 January 2020	07/02/2020

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102013020393 A1	11-06-2015	DE 102013020393 A1	11-06-2015
		RU 2014149552 A	27-06-2016
US 5244252 A	14-09-1993	US 5244252 A	14-09-1993
		US 5460427 A	24-10-1995
US 2012104819 A1	03-05-2012	CN 202294353 U	04-07-2012
		RU 115730 U1	10-05-2012
		US 2012104819 A1	03-05-2012