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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) SEATING AND/OR LOUNGING FURNITURE

(57) A seating and/or lounging furniture comprises essentially the following features:
- a seat frame (7),
- an extendable footrest (4),
- a footrest frame (6), which is displaceable on the seat frame (7), and on the front end of which the footrest (4) is held movably, pivotable around a pivot axis (13),
- at least one drive (11) for displacement of the footrest frame (6) along a displacement distance relative to the seat frame (7), and
- at least one operating rod (14) for swinging the footrest (4) in and out, around the pivot axis (13), wherein the operating rod (14) is connected at one end to the footrest (4), while the other end of the operating rod (14) is connected to the seat frame (7) by means of an articulated joint mechanism (16), so that displacement of the footrest frame (6) over at least 60%, preferably over at least 80%, and extremely preferably over at least 90% of the displacement distance causes a simultaneous pivoting movement of the footrest (4) about the pivot axis (13).

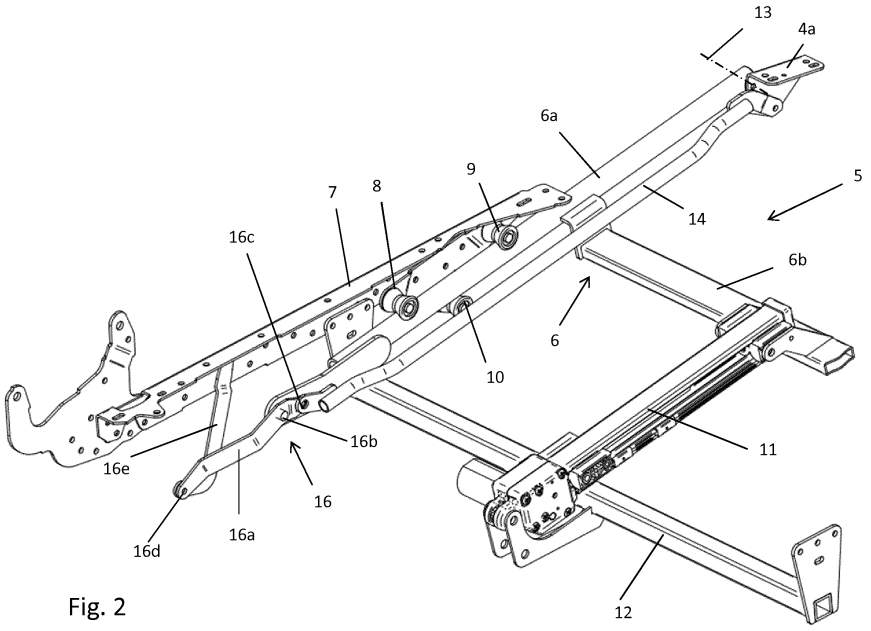

Fig. 2

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Description

[0001] The invention relates to seating and/or lounging furniture having an extendable footrest.

[0002] German Utility model DE-U-87 03 625 discloses an armchair having an extendable footrest in which the footrest is connected to a displaceable frame by means of a scissors mechanism. The actuating device acts on a hinge point between two connecting rods of the scissors mechanism. This known armchair allows the heels of a person resting in the armchair to be supported due to the great cantilever range of the scissors mechanism. However, this known approach requires a relatively large amount of space in the retracted condition and also requires safety measures to prevent jamming during movement of the footrest in the extended condition.

[0003] DE 20 2015 006 245 U discloses a much more compact approach, in which the seating and/or lounging furniture has essentially an extendable footrest, a frame that is displaceable on the base frame of the furniture, with a footrest connected to the front end of the frame as well as an actuating device for extending and retracting the footrest. In addition, it is provided that the footrest is held, so that it is pivotable about a pivot axis on the front end of the frame. The extension and retraction of the footrest take place by means of an operating rod in combination with the displaceable frame, so that the scissors mechanism can be omitted. However, the extension and/or retraction of the footrest take place relatively abruptly, only at the end of the travel distance of the displaceable frame.

[0004] The object of the invention is therefore to further improve upon the extension and retraction of the footrest, while maintaining strict safety requirements and preventing any possible risk of injury.

[0005] This object is achieved according to the invention by the features of claim 1.

[0006] The seating and/or lounging furniture according to the invention has essentially the following features:

- a seat frame,
- an extendable footrest,
- a footrest frame which is displaceable on the seat frame, on the front end of which the footrest is held movably, pivotable around a pivot axis,
- a drive for displacement of the footrest frame along a displacement distance relative to the seat frame, and
- at least one operating rod for swinging the footrest out and in around the pivot axis, wherein the operating rod is connected to the footrest at one end, while the other end of the operating rod is connected to the seat frame by means of a hinge mechanism so that a displacement of the footrest frame over at least 60%, preferably over at least 80% and most preferably over at least 90% of the displacement distance causes a simultaneous pivoting movement of the footrest about the pivot axis.

[0007] Due to the connection of the operating rod to the seat frame, the pivoting movement of the footrest is synchronized with the displacement of the footrest frame over a significantly greater displacement distance. The footrest is swung out and is thus swung simultaneously over most of the total displacement distance of the footrest frame so that swinging the footrest out and in takes place much more slowly in comparison with DE 20 2005 006 245 U and is therefore much more pleasant for the user. Avoiding the use of a scissors mechanism also minimizes the risk of injury.

[0008] Additional advantages and embodiments of the invention are the subject matter of the dependent claims.

[0009] According to one embodiment of the invention, the footrest frame is mounted displaceably in at least one guide profile. According to a preferred embodiment, the footrest frame is guided on the seat frame by means of guide rollers. The simultaneous pivoting movement of the footrest over most of the displacement distance of the footrest frame is ensured by the hinge mechanism to which the end of the operating rod facing away from the footrest is connected to the seat frame. This hinge mechanism preferably has a first hinge lever which is preferably connected to the rear end of the footrest frame in an articulated connection by means of a central hinge point. According to another embodiment the first hinge lever has a first outer hinge point for connection to the operating rod in an articulated connection and has a second outer hinge point for connection to a second hinge lever. The second hinge lever can in particular be connected in an articulated connection to the first hinge lever at one end and also to the seat frame at a second end.

[0010] According to another embodiment of the invention, the operating rod is arranged behind the footrest frame so that it is concealed at least 80%, preferably at least 90% in a side view of the sitting and/or lounging furniture with the footrest extended. This construction results in an aesthetically attractive external appearance that is easy to implement structurally. Due to the construction of the displaceable footrest frame however a sufficient stability is ensured even when the footrest is fully extended. In addition it is possible to provide that the operating rod is arranged behind the footrest frame so that it is at least 80% concealed, preferably at least 90% in a side view of the seating and/or lounging furniture with the footrest retracted. Therefore the seating and/or lounging furniture gives an aesthetically attractive appearance, whether the footrest is extended or retracted.

[0011] To ensure a sufficiently great supporting surface for the user's feet, the footrest may also have an extra supporting element connected to it in an articulated connection in addition to having the main supporting element. The additional supporting element may then ex-

pediently be connected to the operating rod by means of a connecting arm in an articulated connection to make it possible to extend or retract the main supporting element and the additional supporting element at the same time.

[0012] Additional embodiments of the invention are described in greater detail below on the basis of the following description of one exemplary embodiment of the drawings.

[0013] In the drawings:

Fig. 1 shows a schematic sectional view of the seating and/or lounging furniture according to the invention with the footrest extended,

Fig. 2 shows a three-dimensional diagram of an actuating mechanism according to a first exemplary embodiment in the extended position of the footrest,

Figs. 3a-3c show side views of the actuating mechanism (as seen from the inside to the outside) in three different positions of the footrest,

Fig. 4 shows a side view of the position according to Fig. 3c as seen from the outside,

Fig. 5 shows a three-dimensional diagram of an actuating mechanism according to a second exemplary embodiment in which the footrest has, in addition to a main supporting element, also an additional supporting element connected thereto with an articulated connection,

Figs. 6a-6c show side views of the actuating mechanism according to Fig. 5 in various positions of the footrest.

[0014] The seating and/or lounging furniture illustrated in Fig. 1 is for example an armchair or a sofa. In the exemplary embodiment shown here, the seating and/or lounging furniture has a seat 1, a backrest 2, an armrest 3 and a footrest 4, wherein the footrest 4 is shown in the extended state in Fig. 1.

[0015] Fig. 2 shows an actuating mechanism 5 for extending and retracting the footrest 4. It has a footrest frame 6 consisting of two rods 6a (only one of the two rods is shown in Fig. 2) and at least one crossbar 6d connecting the two rods 6a. This forms an essentially H-shaped footrest frame 6, which is mounted displaceably in the area of its two opposing rods 6a. In the exemplary embodiment illustrated here, each rod 6a on the seat frame 7 is mounted by means of two guide rolls 8, 9 arranged above the rod 6a and one guide roll 10 arranged below the rod, so that the footrest frame 6 is guided in a stable manner and is displaceable along the extent of the rods 6a on the seat frame 7.

[0016] The footrest frame 6 is displaced by means of a drive 11, which is designed as a linear motor and is connected at one end to a crossbar 12, which is firmly connected to the seat frame 7, and to the crossbar 6b of the footrest frame 6 at its other end. Therefore, actuation of the drive 11 results in a parallel displacement of the crossbar 6b relative to the stationary crossbar 12 of the seat frame 7 after the crossbar 6b has been firmly connected to the rods 6a, so that actuation of the drive results in displacement of the footrest frame 6 along a displacement distance, which is predetermined by the guide rollers 8-10. However, a slide bearing or any other suitable type of bearing could be provided instead of guide rollers 8-10, for example.

[0017] The additional embodiments of the actuating mechanism 5 are described in greater detail below with reference to Fig. 2 and the various positions of the footrest illustrated in Figs. 3a to 3c. Fig. 3a shows the retracted position of the footrest; Fig. 3c shows the extended position and Fig. 3b shows an intermediate position. The maximum displacement distance of the footrest frame 6 is thus indicated by a comparison of the Figs. 3a and 3c, each of which illustrates the end positions of the footrest frame 6.

[0018] In this exemplary embodiment, the footrest 4 has a main supporting element 4a which is held movably at the end of the rod 6a to pivot about a pivot axis 13. The pivoting movement of the footrest 4 which is synchronized with the displacement of the footrest frame 6 is implemented with an operating rod 14, which is connected with an articulated joint to the footrest 4 at one end and/or to the main supporting element 4a at a hinge point 15 (Fig. 2a). At the other end of the operating rod 14, an articulated joint mechanism 16 is provided, with which the operating rod 14 is connected to the footrest frame 6 as well as to the seating frame 7.

[0019] The articulated joint mechanism 16 comprises a first joint lever 16a, which is connected to the footrest frame 6 at a middle joint position 16b in an articulated connection. The operating rod 14 is connected to a first outer hinge point 16c of the first joint lever 16a at its end facing away from the footrest 4. At the other end of the first joint lever 16a, a second outer hinge point 16d is provided, at which the first joint lever 16a is connected to a second joint lever 16e in an articulated connection, wherein the second joint lever 16e is connected to the seat frame 7 in an articulated connection at a third hinge point 16f.

[0020] The positions of the individual joint levers of the articulated joint mechanism 6 with respect to the footrest 4 can be seen in three different positions of the footrest 4 in Figs. 3a to 3c. Figs. 3a to 3c show a side view of the actuating mechanism 5 from the center of the seating and/or lounging furniture, as seen from the outside. It can be seen in Fig. 3c in particular that operating rod 4 and rod 6a of the footrest frame are designed to be parallel and overlapping. When the seating and/or lounging fur-

niture is seen from the outside (see Fig. 4), the operating rod 14 is covered completely by the rod 6a of the footrest frame, resulting in a particularly slender construction. The footrest frame 8 is arranged to be guided by means of the guide rollers 8-10 inside the seat frame 7, so that injury of the user can be ruled out. Only in the area of the folding movement of the footrest 4 on the forward end of the operating rod 14 are suitable covers and/or safety measures provided to prevent injury to the user.

[0021] Fig. 5 shows a second exemplary embodiment of the invention which corresponds essentially to the exemplary embodiment according to Fig. 2. There is only one difference in the area of the footrest 4, which also discloses, in addition to the main supporting element 4a in the exemplary embodiment according to Fig. 5, an additional supporting element 4b connected thereto in an articulated connection. As can be seen in particular from Figs. 6a to 6c, the main supporting element 4a and the additional supporting element 4b are connected to each other by an articulated point 4c.

[0022] The operating rod 14 is still connected to the main supporting element 4a via the hinge point 15 in an articulated connection. However, the operating rod 14 is still connected to the additional supporting element 4b by means of a connecting arm 4d in an articulated connection. Displacement of the operating rod 4 relative to the footrest frame 6 thus causes not only a pivoting movement of the main supporting element 4a about the pivot axis 13, but at the same time also causes the additional supporting element 4b to be pivoted outward by means of the connecting arm 4d at the same time. Due to this construction, the footrest 4 may be designed to be somewhat larger and is also shown in the retracted condition of the footrest, so that the footrest is also folded away, so that it is much more compact and therefore can be placed beneath the seat 1 more easily and in a more aesthetically attractive manner.

Claims

1. A seating and/or lounging furniture, comprising

- a seat frame (7),
- an extendable footrest (4),
- a footrest frame (6), which is displaceable on the seat frame (7) and on the front end of which the footrest (4) is held movably, pivotable around a pivot axis (6),
- at least one drive (11) for displacement of the footrest frame (6) along a displacement distance relative to the seat frame (7), and
- at least one operating rod (14) for swinging the footrest (4) out and in around the pivot axis (13), wherein the operating rod (14) is connected at one end to the footrest (4),

characterized in that the other end of the operating rod (14) is connected to the seat frame (7) by means of a hinge mechanism (16), so that a displacement of the footrest frame (6) over at least 60%, preferably over at least 80%, and extremely preferably over at least 90% of the displacement distance causes a simultaneous pivoting movement of the footrest (4) about the pivot axis (13).

2. The seating and/or lounging furniture according to claim 1, **characterized in that** the footrest frame (6) is supported displaceably in at least one guide profile.

3. The seating and/or lounging furniture according to claim 1, **characterized in that** the footrest frame (6) is supported displaceably on the seat frame (7) by means of guide rollers (8, 9, 10).

4. The seating and/or lounging furniture according to claim 1, **characterized in that** the articulated joint mechanism comprises a first articulated lever (16a), which is connected to the rear end of the foot rest frame (6) in an articulated connection.

5. The seating and/or lounging furniture according to claim 4, **characterized in that** the first articulated lever (16a) has a central hinge point (16b), with which it is connected to the footrest frame (6) in an articulated connection and has a first outer hinge point (16c) for an articulated connection to the operating rod (14) and a second outer hinge point (16d) for connection to a second articulated lever (16e).

6. The seating and/or lounging furniture according to claim 5, **characterized in that** the second articulated lever (16e) has an articulated connection to the first articulated lever (16a) at one end and an articulated connection to the seat frame (7) at a second end.

7. The seating and/or lounging furniture according to claim 1, **characterized in that**, when the footrest (4) is extended, the operating rod (14) is arranged so that, in a side view of the seating and/or lounging furniture, the footrest is at least 80% concealed, preferably at least 90% concealed, behind the footrest frame (6).

8. The seating and/or lounging furniture according to claim 7, **characterized in that** when the footrest (4) is folded in, the operating rod (14) is arranged, so that it is at least 80% concealed, preferably at least 90% concealed, behind the footrest frame (6), as seen in a side view of the seating or lounging furniture.

9. The seating and/or lounging furniture according to claim 1, **characterized in that** the footrest (4) has a main supporting element (4a) and an additional sup-

porting element (4b) connected to the former in an articulated connection.

10. The seating and/or lounging furniture according to claim 9, **characterized in that** the additional supporting element (4b) is also connected to the operating rod (14) by means of a connecting arm (4c) in an articulated connection.

Amended claims in accordance with Rule 137(2) EPC.

1. A seating and/or lounging furniture, comprising

- a seat frame (7),
- an extendable footrest (4),
- a footrest frame (6), which is displaceable on the seat frame (7) and on the front end of which the footrest (4) is held movably, pivotable around a pivot axis (6),
- at least one drive (11) for displacement of the footrest frame (6) along a displacement distance relative to the seat frame (7), and
- at least one operating rod (14) for swinging the footrest (4) out and in around the pivot axis (13), wherein the operating rod (14) is connected at one end to the footrest (4),

characterized in that the other end of the operating rod (14) is connected to the seat frame (7) by means of an articulated joint mechanism (16), so that a displacement of the footrest frame (6) over at least 60% of the displacement distance causes a simultaneous pivoting movement of the footrest (4) about the pivot axis (13).

2. The seating and/or lounging furniture according to claim 1, **characterized in that** the footrest frame (6) is supported displaceably in at least one guide profile.

3. The seating and/or lounging furniture according to claim 1, **characterized in that** the footrest frame (6) is supported displaceably on the seat frame (7) by means of guide rollers (8, 9, 10).

4. The seating and/or lounging furniture according to claim 1, **characterized in that** the articulated joint mechanism (16) comprises a first articulated lever (16a), which is connected to the rear end of the foot rest frame (6) in an articulated connection.

5. The seating and/or lounging furniture according to claim 4, **characterized in that** the first articulated lever (16a) has a central hinge point (16b), with which it is connected to the footrest frame (6) in an articulated connection and has a first outer hinge point (16c) for an articulated connection to the operating rod (14) and a second outer hinge point (16d) for connection to a second articulated lever (16e).

6. The seating and/or lounging furniture according to claim 5, **characterized in that** the second articulated lever (16e) has an articulated connection to the first articulated lever (16a) at one end and an articulated connection to the seat frame (7) at a second end.

7. The seating and/or lounging furniture according to claim 1, **characterized in that**, when the footrest (4) is extended, the operating rod (14) is arranged so that, in a side view of the seating and/or lounging furniture, the footrest is at least 80% concealed, behind the footrest frame (6).

8. The seating and/or lounging furniture according to claim 7, **characterized in that** when the footrest (4) is folded in, the operating rod (14) is arranged, so that it is at least 80% concealed, behind the footrest frame (6), as seen in a side view of the seating or lounging furniture.

9. The seating and/or lounging furniture according to claim 1, **characterized in that** the footrest (4) has a main supporting element (4a) and an additional supporting element (4b) connected to the former in an articulated connection.

10. The seating and/or lounging furniture according to claim 9, **characterized in that** the additional supporting element (4b) is also connected to the operating rod (14) by means of a connecting arm (4c) in an articulated connection.

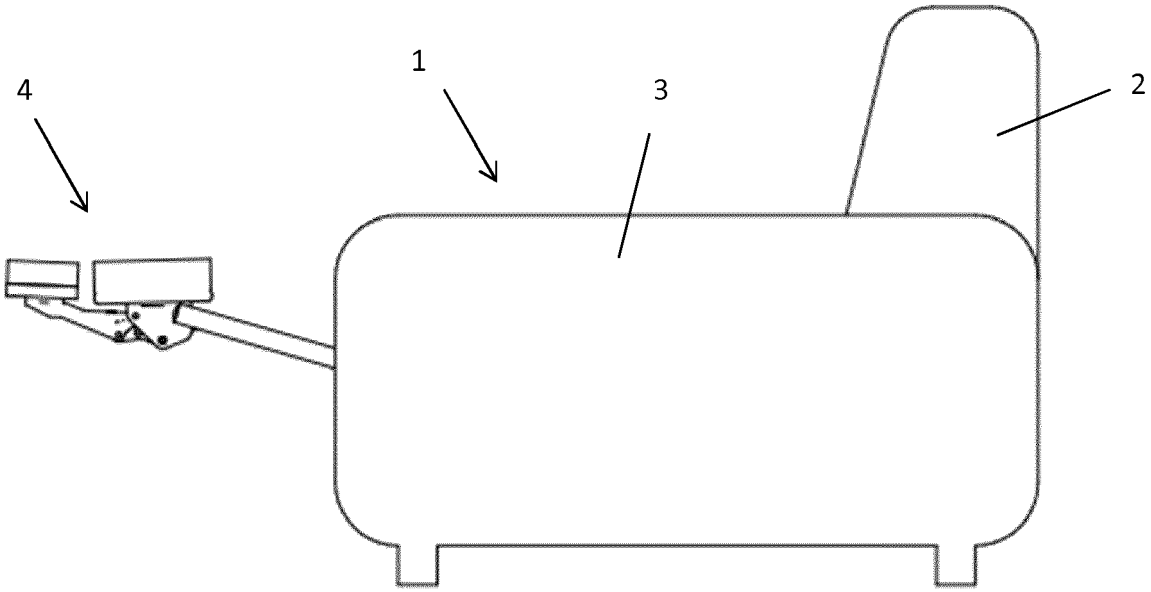

Fig. 1

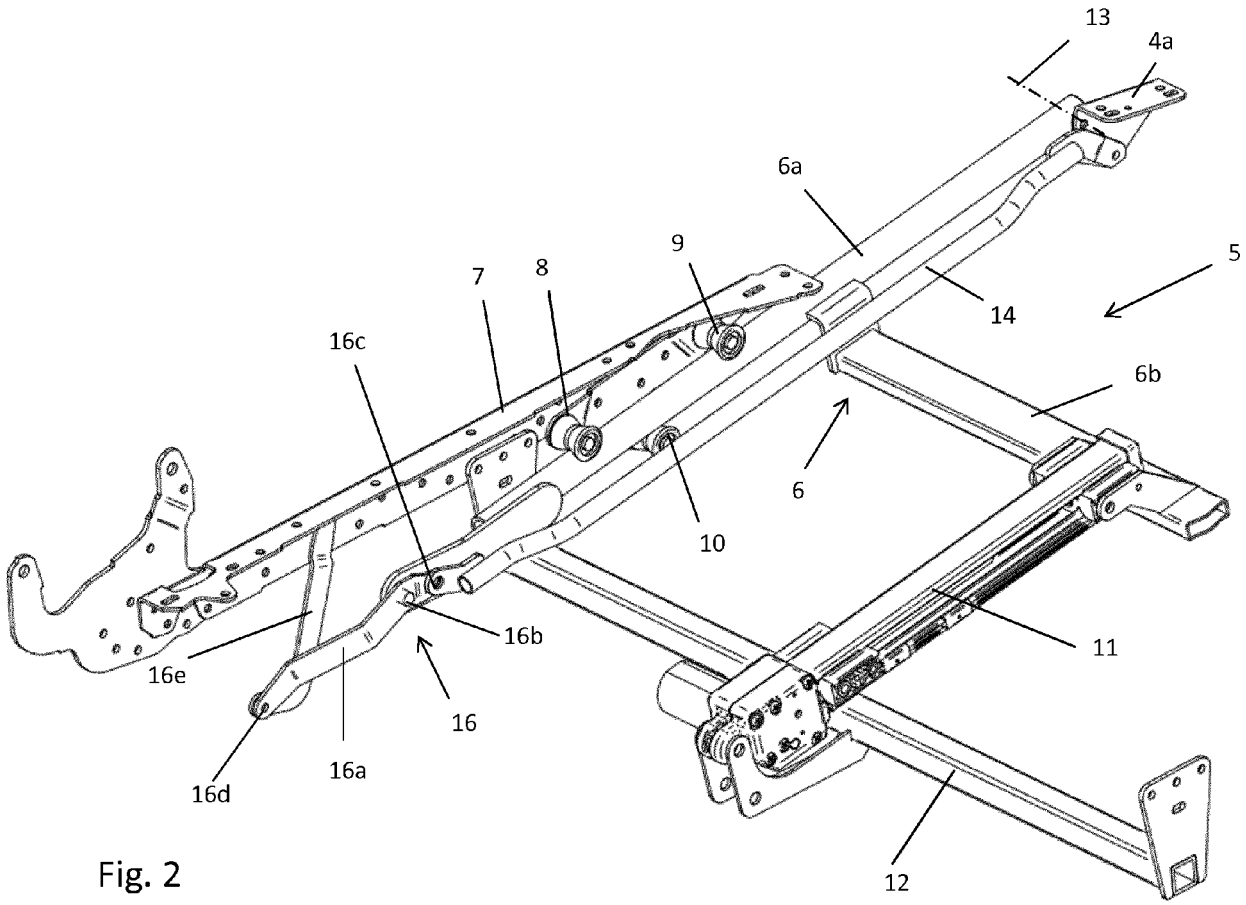

Fig. 2

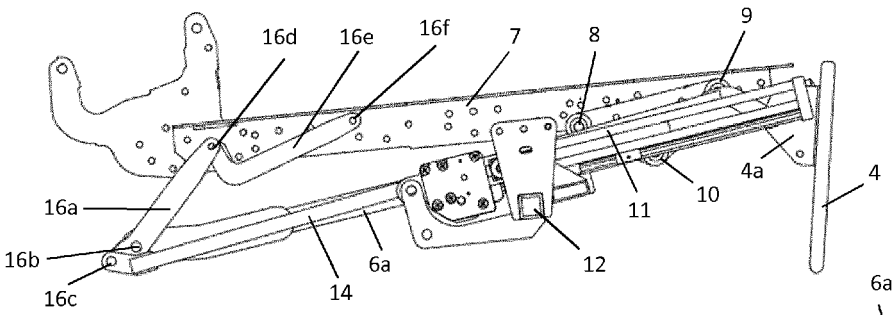

Fig. 3a

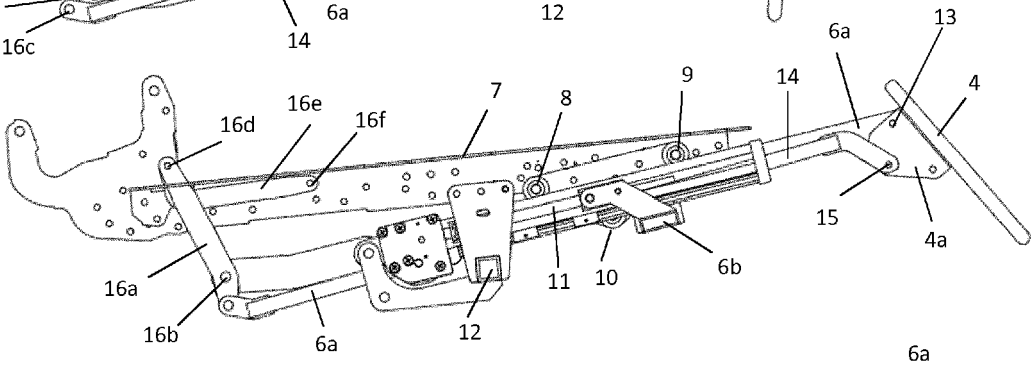

Fig. 3b

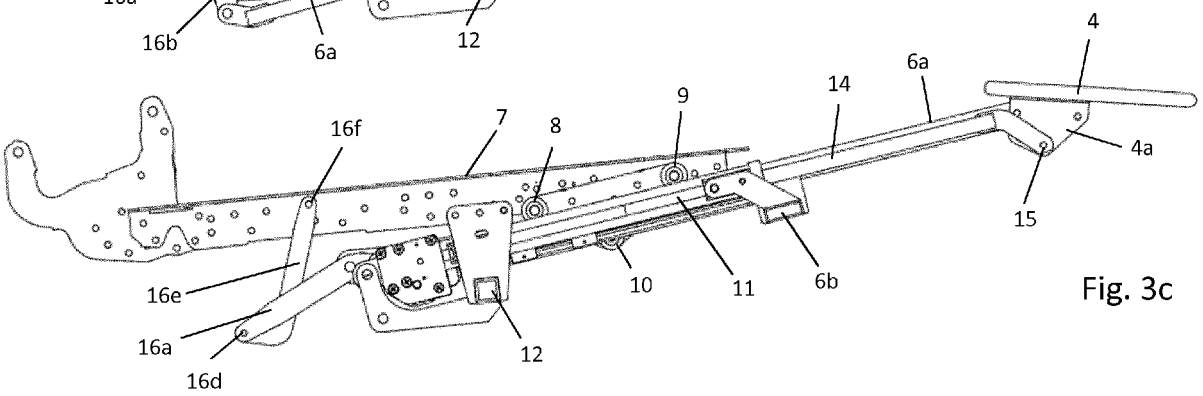

Fig. 3c

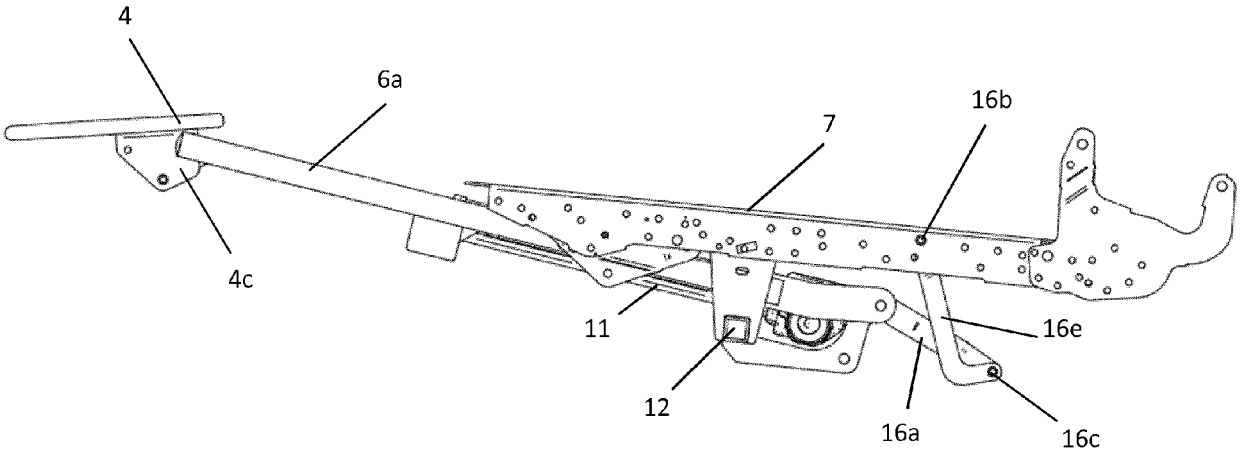

Fig. 4

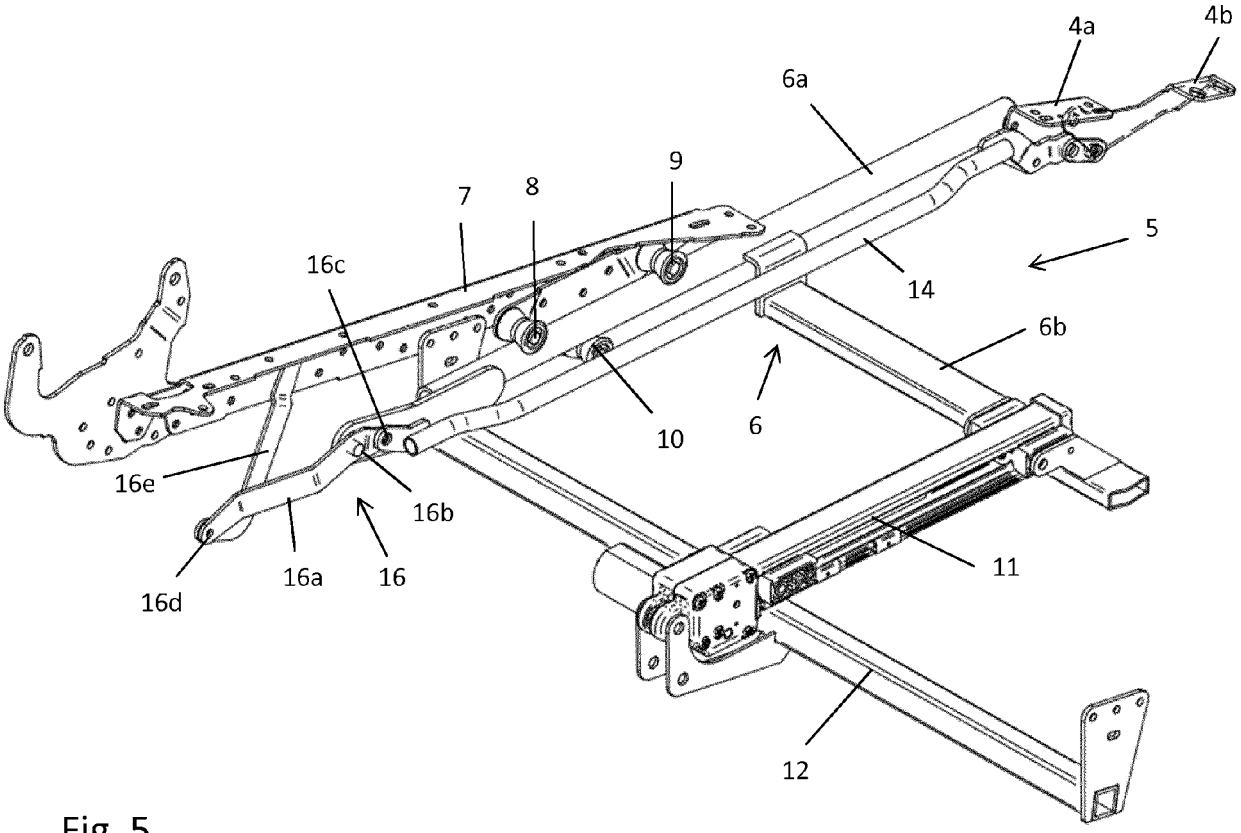

Fig. 5

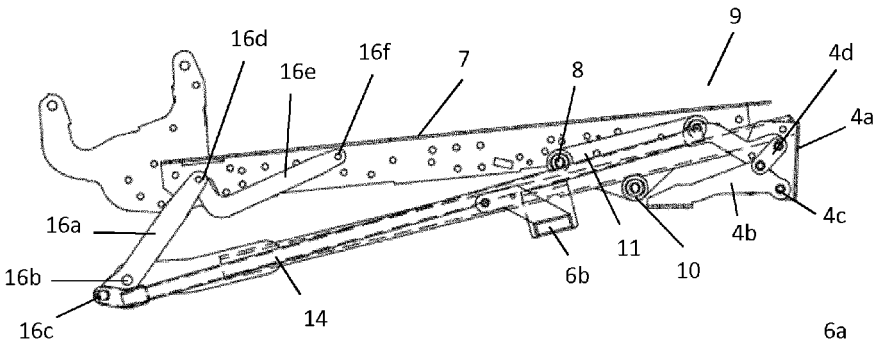

Fig. 6a

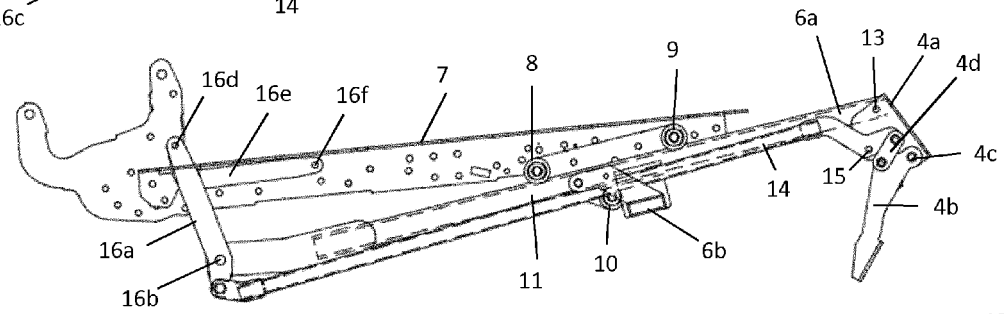

Fig. 6b

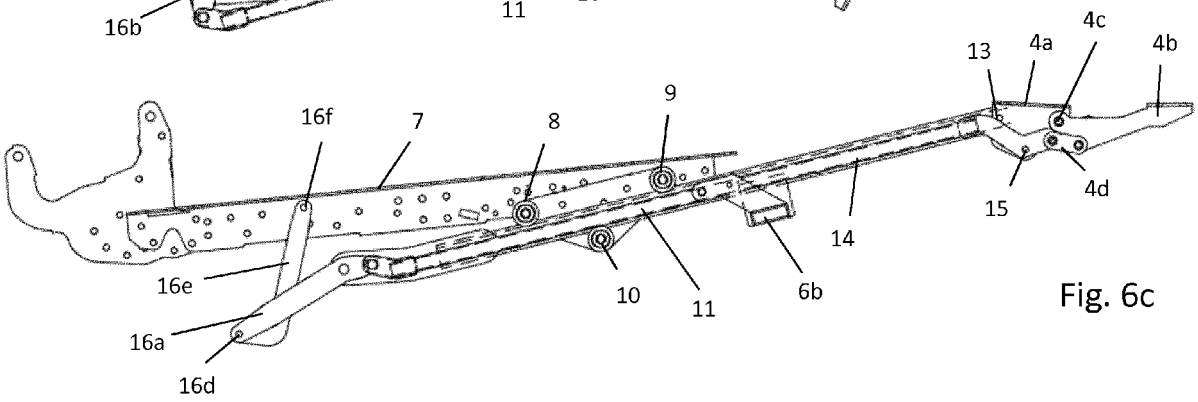

Fig. 6c

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EUROPEAN SEARCH REPORT

Application Number
EP 19 18 2200

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	DE 197 43 188 A1 (FRANK WOLFGANG [DE]) 8 April 1999 (1999-04-08) * column 3, lines 14-23; figures *	1-4 5-10	INV. A47C7/50
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TECHNICAL FIELDS SEARCHED (IPC)

A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 July 2019	Kis, Pál

CATEGORY OF CITED DOCUMENTS

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