(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 903 642 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.11.2021 Bulletin 2021/44

(51) Int Cl.:
A47C 1/032 *(2006.01)*

(21) Application number: **21175106.0**

(22) Date of filing: **23.05.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **10.06.2016 IT UA20164261**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
17733891.0 / 3 468 416

(71) Applicant: **CO.FE.MO. Industrie S.R.L.**
25045 Castegnato (BS) (IT)

(72) Inventor: **MORESCHI, Sergio**
25045 Castegnato (IT)

(74) Representative: **Tirloni, Bartolomeo**
BTA Srl
2nd floor
Viale Papa Giovanni XXIII, 106
24121 Bergamo (IT)

Remarks:
This application was filed on 20.05.2021 as a divisional application to the application mentioned under INID code 62.

(54) ARTICULATION SYSTEM FOR CHAIRS

(57) An articulation system (1) for chairs, the system comprising a main frame (2); a support for a seat (4) mounted on the main frame; an articulation element (8) hinged to the main frame (2) so that it can rotate about an axis of rotation (9), wherein the support for the seat (4) is hinged to the articulation element (8) at a first hinge point (10) and to a slider (12) at a second hinge point (11) located at the front of the support for the seat, wherein the slider (12) can slide along a guide (13) solidly constrained to the main frame; a support for a backrest (5) coupled to the articulation element (8),
wherein in a reference plane perpendicular to the axis of rotation (9), the guide (13) determines a path for the second hinge point (11), said path having at least one path section (14) that is rectilinear and wherein in the at-rest configuration the first hinge point (10) is found interposed between a line (30) vertical to the axis of rotation (9) and a line (31) vertical to the second hinge point (11).

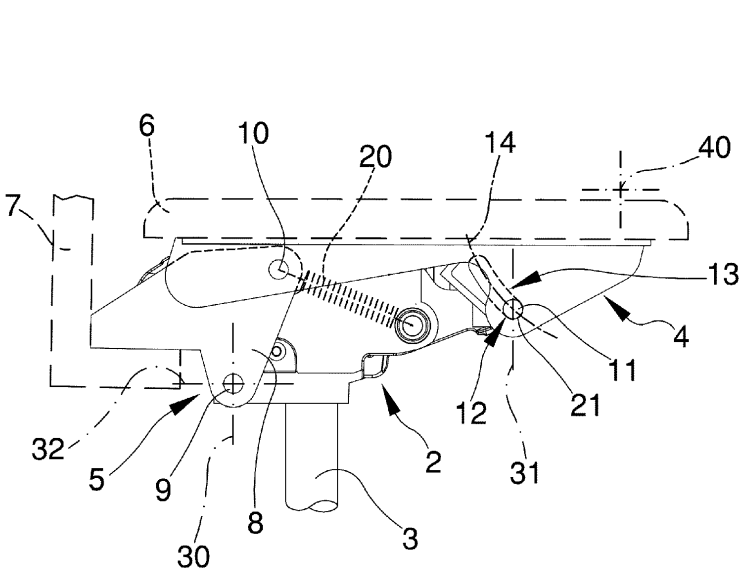

Fig.1

EP 3 903 642 A1

Description

[0001] The present invention refers to an articulation system for chairs, particularly of the type in which the movements of the seat and backrest are synchronized with respect to each other.

[0002] There are prior-art chairs, particularly office chairs, which comprise an articulation system comprising a main frame constrained to a base for resting the chair on the ground, a support for the seat and a support for the backrest of the chair. The support for the seat and the support for the backrest are both articulated with respect to the frame and, owing to an articulation mechanism that connects them, they are articulated with respect to each other so that a movement of one corresponds to a predetermined movement of the other (this articulation mechanism is defined as "synchronized" in the technical jargon of this field). In certain solutions, the articulation mechanism connecting the two supports is adjustable so that the relation between the two movements can be changed.

[0003] When one of the two supports is moved by pressure exerted by the user, the system resists with an elastic reaction that tends to return both supports back to the at-rest configuration (that is, without any pressure being applied). This reaction is typically obtained by means of an elastic element, for example at least one spring.

[0004] WO 2009/153811 A1 discloses an adjustment device for chairs, comprising a main body, which can be engaged onto a supporting shank of a chair; a prop element mounted on the main body; a backrest mounted onto the main body; and articulation means for movably engaging the backrest and the seat support to the main body, the articulation means comprising a lever pivoting around the main body and hinged to the prop element and to the backrest so as to obtain a given relation of movement between the backrest and the prop element.

[0005] WO 2010/097818 A1 discloses a device for synchronizing the inclination of the backrest and seat of a chair, of the type comprising a frame for the backrest, a frame for the seat and a support integral with the base of the chair, as well as a first crank integral with the frame for the backrest and hinged to the rear part of the frame for the seat and to the support, and a second crank hinged to the front part of the frame for the seat and to the support, so as to form, together with the frame for the seat, an articulated quadrilateral. The Applicant has found that the prior-art articulation systems for chairs have several drawbacks and/or that several aspects thereof can be improved.

[0006] For example, the Applicant has noted that because of their structures being based on levers or cranks pivoted to the main frame, the articulation systems of WO 2009/153811 A1 and WO 2010/097818 A1 determine a rotational-translational movement of the seat in which the vertical and horizontal components of the translational motion of the front part of the seat are rigidly determined. In particular, the Applicant has observed that the front hinge point of the seat completes an arc of a circle with the centre facing the rear part of the system, and this, given a certain relation between the vertical component and the horizontal component of the translational motion of the front part of the seat in the initial tract of the movement, determines a modification of this relation in the course of the movement, becoming increasingly imbalanced in favour of the horizontal component to the disadvantage of the vertical component. In particular, the elevation rate of the front part of the seat as a function of the rotation of the backrest proves to gradually decrease upon an increase in the degree of inclination of the backrest with respect to the at-rest position. This leads to the fact that the effect of the user's weight on the seat, which tends to resist inclination, tends to decrease upon an increase in the inclination of the backrest, to the point that the effect is eliminated, and potentially change direction when having greater inclinations.

[0007] According to the Applicant once again, this pattern brings about a response to the inclination perceived by the user that is not always optimal for the entire course of travel for the inclination, and/or it brings about limitations in the measure of the inclination of the backrest and/or chair.

[0008] An aim of the present invention is to develop an articulation system for chairs which resolves one or more of the issues described above.

[0009] This aim is achieved by an articulation system for chairs in accordance with the appended claims and/or having the following characteristics.

[0010] According to a first aspect, the invention refers to an articulation system for chairs, the system comprising:

- a main frame designed to be associated with a base for a chair;
- a support for a seat mounted on said main frame;
- an articulation element that is rigid and hinged to said main frame so that it can rotate about an axis of rotation, wherein said support for the seat is hinged to said articulation element at a first hinge point;
- a support for a backrest coupled to said articulation element;
- a slider that is slidably movable along a guide solidly constrained to said main frame,

wherein said support for the seat is hinged to said slider at a second hinge point located in a front portion of the support for the seat,

wherein in a reference plane perpendicular to said axis of rotation, said guide determines a path for said second hinge point, said path having at the least one path section that is rectilinear.

[0011] In accordance with a further aspect, the present invention concerns a chair comprising the articulation system in accordance with the first aspect.

[0012] The terms vertical, horizontal, upper, lower and suchlike refer to a state of normal use of a chair that

incorporates the articulation system of the present invention.

[0013] The terms front and rear refer to normal use of a chair that incorporates the present invention, in which the user's legs are at the front side of the system.

[0014] According to the Applicant, the systems for synchronized articulation of a backrest and seat disclosed in WO 2009/153811 A1 and WO 2010/097818 A1, which utilize rods for articulating the seat and main body, are such that the front hinge point of the seat is forced to travel, in the reference plane, a path in the form of an arc of a circle with the concavity facing the axis of rotation of the rear articulation rod.

[0015] This movement of the front hinge point constitutes a mechanical constraint that creates an upper dead centre of the path of the hinge point, in which the latter moves almost horizontally, and/or predetermined dynamics of variations in the relation between the vertical and horizontal component of the translational motion of the front part of the seat. This, in turn, brings about functional limits in the overall articulation system, for example of the type described hereinabove.

[0016] However, owing to the articulation of the front part of the seat and the main frame with the guide and slider, wherein the slider can follow a path along the guide, said path being at least partially rectilinear, the present solution produces a movement of the front part of the seat without any upper dead centres.

[0017] In this manner, the measure of the range of inclination and/or the maximum degree of inclination that can be reached by the backrest can be increased.

[0018] The present solution also makes it possible to maintain a desired elevation rate for the front part of seat as a function of the rotation of the articulation element, for the entire course of travel for the rotation of the latter.

[0019] The development of this elevation rate depends on the specific design of the guide.

[0020] For example, for rectilinear guides, the relation between the horizontal and vertical components of the translational motion of the front part of the seat remains constant throughout the entire course of travel for the tilting movement.

[0021] Moreover, according to the Applicant, without being bound to any theory, and with respect to the above-mentioned solutions of the prior art, the above-mentioned characteristics determine a different resolution of the elastic reaction force acting upon the second hinge point of the seat, with effects that are advantageous in terms of the response of the articulation system to inclination as a function of the degree of inclination and/or the user's weight.

[0022] In one or more of the above-mentioned aspects, the present invention can have one or more of the following preferred characteristics, some of which refer to the above-mentioned reference plane.

[0023] Said path section typically coincides with the entire path possible for said second hinge point.

[0024] Preferably, said rectilinear section is inclined with respect to a horizontal direction so that one rotation of the articulation element away from a front portion of the articulation system corresponds to an elevation of the second hinge point. In this manner, the weight force of the user opposes inclination in a manner proportional to the weight itself.

[0025] Preferably, said rectilinear path section forms an acute angle with the horizontal direction, said acute angle being located above said horizontal direction and facing rearwards. In this manner, an advantageous spatial orientation of the path section is achieved.

[0026] Said acute angle is preferably greater than or equal to 5°, more preferably greater than or equal to 10°.

[0027] Said acute angle is preferably less than or equal to 40°, more preferably less than or equal to 30°.

[0028] Advantageously, in this manner one rotation of the first hinge point corresponds to an optimal elevation of the second hinge point.

[0029] In an alternative embodiment, said rectilinear path section is horizontal.

[0030] The first hinge point is preferably located in a rear portion of the support for the seat. The structure thus proves to be compact.

[0031] The system is preferably configured to assume an at-rest configuration in the absence of tilting forces acting upon the support for the seat and/or backrest. In this at-rest configuration, when the seat is fixed on the support for the seat, the seat is typically arranged horizontally and when the backrest is fixed to the support for the backrest, the backrest is substantially vertical.

[0032] The system is preferably configured to assume a maximum inclination configuration, in which the support for the seat and the support for the backrest assume the maximum inclination possible with respect to the at-rest position.

[0033] Said guide typically has a lower end, which typically has a lower abutment surface, and an upper end, which typically has an upper abutment surface, wherein in the at-rest configuration and in the maximum inclination configuration, the slider is found at the lower and upper end of the guide, respectively, preferably abutting against said lower and/or upper abutment surface, respectively. Advantageously, the guide thus also acts as a stopping point.

[0034] Preferably, in said at-rest configuration, the first hinge point is found, with reference to said reference plane, interposed between a line vertical to said axis of rotation and a line vertical to the second hinge point, and more preferably above a line horizontal to the axis of rotation. In this manner, the articulation system opposes a reaction to the inclination proportional to the weight of the user on the seat (called "self-weighing" in the jargon of this field). In fact, when the user exerts pressure (typically on the backrest), which tends to make the seat tilt by rotational-translational movement of the seat starting from the at-rest configuration, the first hinge point must necessarily rise, thereby overcoming a component of the weight of the user.

[0035] In one embodiment, the support for the backrest is solidly constrained to said articulation element. For example, the articulation element can form one whole element with at least one part of said support for the backrest or the support for the backrest can be rigidly fixed to the articulation element. In this manner, the system in its entirety proves to be simple in construction, reliable and economical in terms of production.

[0036] In one alternative embodiment, the support for the backrest is connected to the articulation element in an articulated manner. In this manner, additional degrees of freedom are introduced between the backrest and the seat, leading to improved ergonomics and/or versatility and/or comfort of the chair.

[0037] In the above-mentioned alternative embodiment, the articulation system preferably comprises an additional articulation element that is rigid and hinged to said main frame so that it can rotate about an additional axis of rotation, wherein said support for the backrest is hinged to said articulation element on a side of the articulation element that is opposite said first hinge point of the seat with respect to said axis of rotation, and it is also hinged to said additional articulation element.

[0038] The articulation system preferably comprises at least one elastic element that is operatively interposed between said main frame and said support for the seat. In this manner, the elastic reaction force developed by the elastic element opposes inclination of the seat with respect to an at-rest state, typically in a more pronounced manner the more accentuated the inclination is.

[0039] Preferably, on one side said elastic element directly abuts against the main frame and on the opposite side against the hinge point and/or the support for the seat. The system thus proves to be structurally simple, rational and effective. Said elastic element is preferably configured to work in extension.

[0040] The chair preferably comprises a supporting base for resting the chair on the ground and a rod mounted on the supporting base for resting the chair on the ground, said main frame being rigidly mounted onto an upper end of said rod.

[0041] The chair preferably comprises a seat for a user that is rigidly coupled to said support for the seat and/or a backrest rigidly coupled to said support for the backrest.

[0042] The characteristics and advantages of the present invention shall be clarified further in the following detailed description of some embodiments, which are presented as nonlimiting examples of the present invention, with reference to the attached figures, of which:

Figure 1 is a schematic side view of a first articulation system in an at-rest configuration;

Figure 2 is a schematic side view of the system of Figure 1 in a maximum inclination configuration;

Figure 3 is a schematic side view of a second articulation system in an at-rest configuration;

Figure 4 is a schematic side view of the system of Figure 3 in a maximum inclination configuration.

[0043] In the articulation systems according to the present invention (not shown), the rectilinear path section (as exemplarily shown in Figures 3 and 4) is combined with a relative arrangement between first hinge point and line 30 vertical to the axis of rotation of the type shown in Figures 1 and 2.

[0044] An articulation system 1 for chairs is shown in the figures. For the purposes of providing a concise description, the same reference numbers are used for corresponding elements.

[0045] The articulation system 1 comprises a main frame 2, which is for example designed to be rigidly mounted onto an upper end of a rod 3 mounted on a base not shown) for resting a chair on the ground.

[0046] The articulation system 1 further comprises a support for the seat 4 and a support for the backrest 5, both of which are mounted on the main frame in an articulated manner.

[0047] The finished chair typically comprises a seat 6 that is rigidly coupled to the support for the seat 4 and a backrest 7 that is rigidly coupled to the support for the backrest 5.

[0048] The articulation system further comprises an articulation element 8 that is rigid and hinged to the main frame so that it can rotate about an axis of rotation 9.

[0049] At the rear, the support for the seat 4 is hinged to the articulation element 8 at a first hinge point 10 preferably located at the rear of the seat, and at the front it is hinged at a second hinge point 11 located at the front of the seat to a slider 12 that is slidably movable along a guide 13 solidly constrained to the main frame 2.The present invention also envisages solutions in which the first hinge point is located in a central position of the support for the seat or in a front position.

[0050] In the shown systems, the slider 12 is a cylindrical pin solidly constrained to the support for the seat 4 and which, at the longitudinal ends thereof, engages a pair of guides 12 that are symmetric with respect to each other, the guides 13 being through openings afforded in the main frame 2.

[0051] With reference to a reference plane perpendicular to the axis of rotation (for example the same lying plane of the figures), the guide 13 according to the present invention determines a path for the front hinge point 11 having at least one rectilinear section 14 (as shown in Figures 3 and 4).

[0052] The articulation system 1 typically comprises at least one elastic element 20 (only schematically illustrated), for example a spring that is operatively interposed between the main frame 2 and the support for the seat 4, so as to oppose inclination of the seat with respect to the at-rest state, in a more pronounced manner the more accentuated the inclination is.

[0053] The elastic element can directly abut against the main frame on one side and, on the other side, against the first and/or second hinge points and/or against the support for the seat and/or against the support for the backrest.

[0054] In Figures 1 and 3, the system 1 is illustrated in an at-rest configuration, in the absence of tilting forces acting on the support for the seat and/or the backrest (or when these tilting forces do not surpass a possible preload force of the elastic element). In this at-rest configuration, the seat 6 is typically arranged horizontally and the backrest 7 is substantially vertical.

[0055] In Figures 2 and 4, the system 1 is illustrated in a maximum inclination configuration, in which the support for the seat and the support for the backrest assume the maximum inclination possible with respect to the at-rest position.

[0056] In the shown systems, the path section 14 coincides with the entire path possible for the front hinge point 11.

[0057] Advantageously, the system can provide a stopping point for the inclination process, at the abutment of the slider 12 against an upper abutment surface 22 of the guide or when the line joining the first and the second hinge point becomes perpendicular to the tangent to the path at the front hinge point (a state beyond which the articulation element cannot rotate further).

[0058] The guide preferably has a lower abutment surface 21, where, in the at-rest configuration, the slider 12 is found at the lower abutment surface.

[0059] In the systems illustrated in Figures 1-4, the support for the backrest 5 forms one whole element (i.e. a single piece) with the articulation element 8. Alternatively, the support for the backrest can be separate from the articulation element, but rigidly fixed to the latter.

[0060] In an alternative embodiment, which is not illustrated here, the support for the backrest is connected to the articulation element in an articulated manner, and in a manner similar to the articulation of the support for the backrest with respect to the main frame and to the support for the seat disclosed in patent WO 2009/153811 A1 cited hereinabove, to which the reader is referred for further information.

[0061] As shown in Figures 1 and 2, in the at-rest configuration, preferably the first hinge point 10, in the reference plane, is interposed between a line 30 vertical to the axis of rotation 9 and a line 31 vertical to the front hinge point 11, and above a line 32 horizontal to the axis of rotation.

[0062] As shown in Figures 3 and 4, the path section 14 is rectilinear and preferably inclined with respect to a horizontal direction 32, and with the latter it forms an acute angle 50 located above the horizontal direction and facing rearwards. By way of example, this acute angle is equal to about 15°.

[0063] The present invention also envisages solutions (not shown) in which this rectilinear path section is arranged horizontally, or vertically or with an inclination that is opposite the inclination shown in Figures 3 and 4.

[0064] Furthermore, the present invention also envisages solutions (not shown) in which in addition to the above-mentioned rectilinear path section, the possible entire path also comprises additional sections that may be curvilinear.

Claims

1. An articulation system (1) for chairs, the system comprising:

   - a main frame (2) designed to be associated with a supporting base for resting a chair on the ground;
   - a support for a seat (4) mounted on said main frame;
   - an articulation element (8) that is rigid and hinged to said main frame (2) so that it can rotate about an axis of rotation (9), wherein said support for the seat (4) is hinged to said articulation element (8) at a first hinge point (10);
   - a support for a backrest (5) coupled to said articulation element (8);
   - a slider (12) that is slidably movable along a guide (13) solidly constrained to said main frame,

   wherein said support for the seat (4) is hinged to said slider (12) at a second hinge point (11) located in a front portion of the support for the seat,
   wherein in a reference plane perpendicular to said axis of rotation (9), said guide (13) determines a path for said second hinge point (11),
   wherein said path has at least one path section (14) that is rectilinear wherein the system is configured to assume an at-rest configuration in the absence of tilting forces acting upon the support for the seat (4) and/or upon the support for the backrest (5),
   and wherein in said at-rest configuration the first hinge point (10) is found, with reference to said reference plane, interposed between a line (30) vertical to said axis of rotation (9) and a line (31) vertical to the second hinge point (11).

2. The articulation system according to claim 1, wherein said rectilinear path section (14) is horizontal or inclined with respect to a horizontal direction (32) so that one rotation of the articulation element (8) away from a front portion of the articulation system corresponds to an elevation of the second hinge point, wherein said rectilinear path section (14) forms an acute angle (50) with the horizontal direction (32), said acute angle (50) being located above said horizontal direction and facing rearwards.

3. The articulation system according to claim 2, wherein said acute angle (50) is greater than or equal to 5°, preferably greater than or equal to 10°, and/or less than or equal to 40°, preferably less than or equal to 30°.

4. The articulation system according to any one of the preceding claims, comprising at least one elastic element (20) operatively interposed between said main frame (2) and said support for the seat (4) and/or said support for the backrest (7), and wherein the articulation system (1) is configured to assume a maximum inclination configuration, wherein the support for the seat and the support for the backrest assume the maximum inclination possible with respect to the at-rest position.

5. The articulation system according to claim 4, wherein said guide (13) has a lower end, which has a lower abutment surface (21), and an upper end, which has an upper abutment surface (22), wherein in the at-rest configuration and in the maximum inclination configuration, the slider is found at the lower and upper end of the guide, respectively, abutting against said lower and upper abutment surface, respectively.

6. The articulation system according to any one of the preceding claims, wherein the support for the backrest (7) is solidly constrained to said articulation element.

7. The articulation system according to any one of the claims from 1 to 5, wherein the support for the backrest (5) is connected to the articulation element (8) in an articulated manner, wherein the articulation system (1) comprises an additional articulation element, that is rigid and hinged to said main frame (2) so that it can rotate about an additional axis of rotation, wherein said support for the backrest (5) is hinged to said articulation element (8) on a side of the articulation element that is opposite said first hinge point (10) of the seat with respect to said axis of rotation (9), and it is also hinged to said additional articulation element.

8. The articulation system according to any one of the preceding claims, wherein said path section (14) coincides with the entire path possible for said second hinge point (11).

9. The articulation system according to any one of the preceding claims, wherein said first hinge point (10) is found, with reference to said reference plane, above a line (32) horizontal to the axis of rotation (9).

10. A chair comprising a supporting base for resting it on the ground, a rod (3) mounted on the supporting base for resting the chair on the ground, the articulation system (1) according to any one of the preceding claims, a seat (6) and a backrest (7), wherein said main frame (2) is rigidly mounted on said rod.

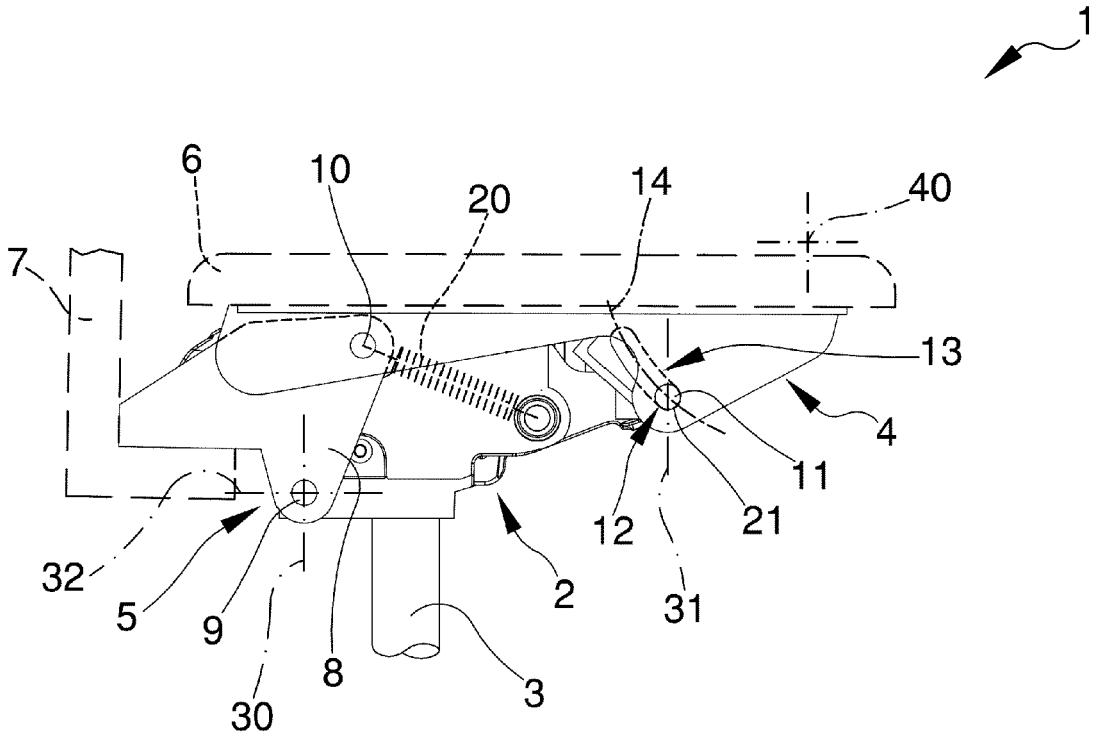
1
6
10
20
14
40
7
13
4
11
12
21
32
5
9
8
2
31
30
3

Fig.1

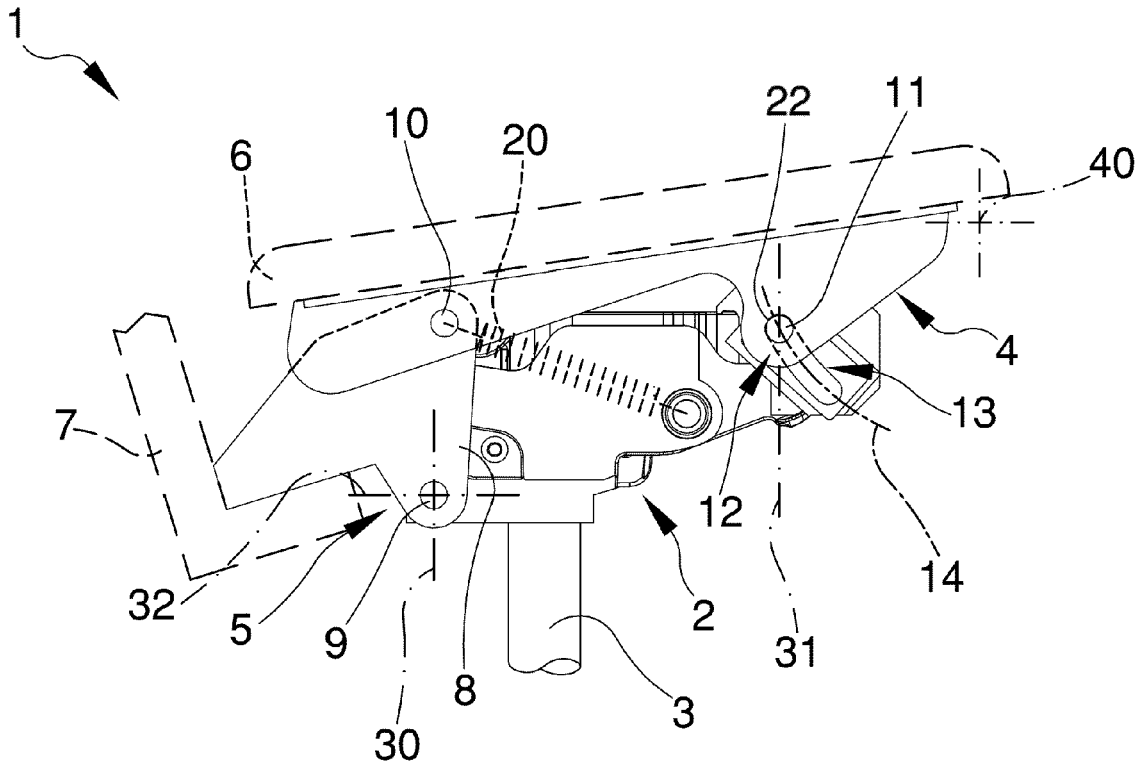
1
22
11
10
20
6
40
4
7
13
12
14
32
5
9
8
2
31
30
3

Fig.2

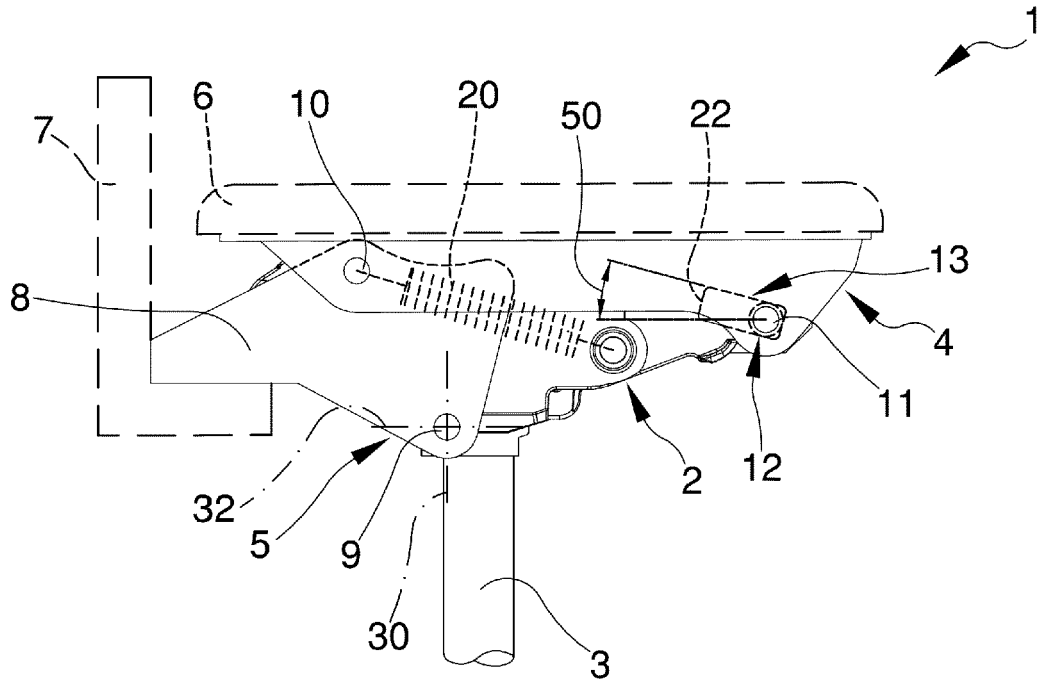
1
6
10
20
50
22
7
13
8
4
11
12
2
32
5
9
30
3

Fig.3

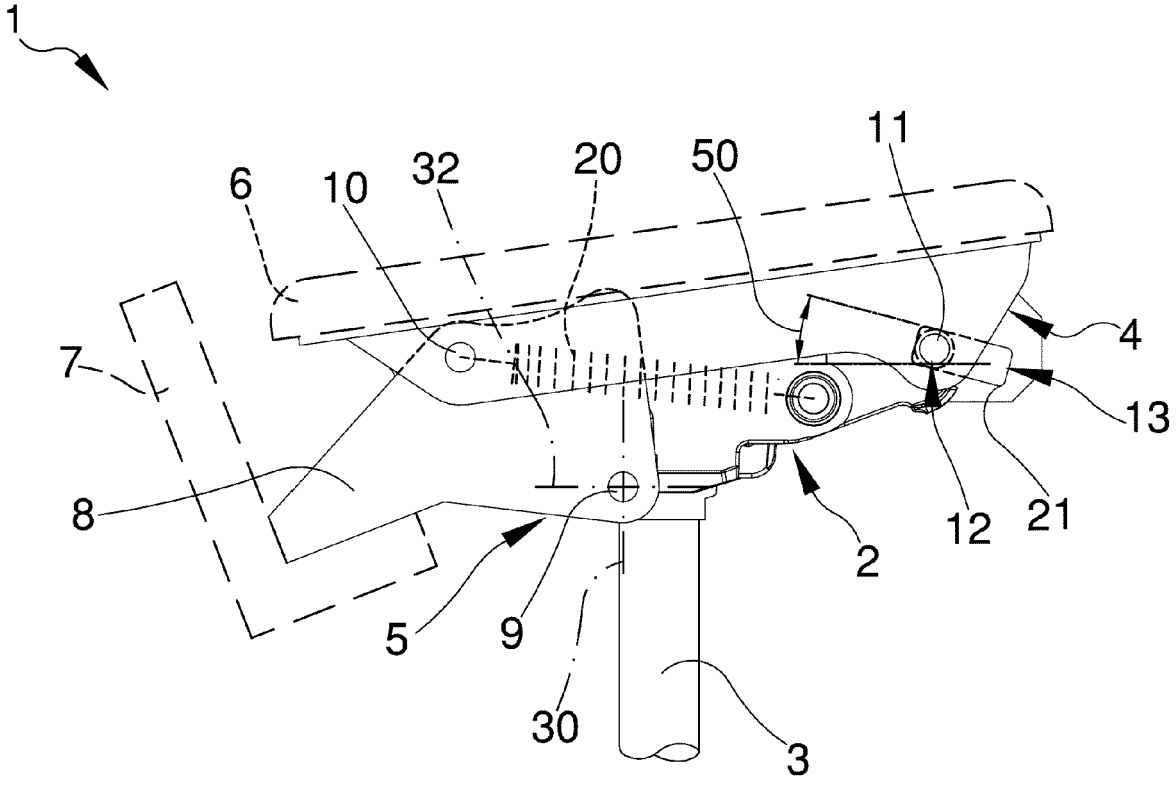
1
11
6
10
32
20
50
4
7
13
8
12
21
2
5
9
30
3

Fig.4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 17 5106

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	WO 2010/094470 A2 (UHLENBROCK CONSULTING [DE]; UHLENBROCK JOHANNES [DE]) 26 August 2010 (2010-08-26) * page 4, paragraph 1; claims; figures 1,2,5 *	1-10	INV. A47C1/032
A	WO 95/12338 A1 (LABOFA AS [DK]; HENSEL WILLI [DE]) 11 May 1995 (1995-05-11) * claim 1; figure 1 *	1	
A	DE 93 02 581 U1 (VERMOEGENSVERWALTUNG FRANZ VOG [DE]) 23 June 1994 (1994-06-23) * claims; figures *	1	
A	EP 1 396 213 B1 (BOCK 1 GMBH & CO [DE]) 9 February 2005 (2005-02-09) * abstract; figures *	1	
A	DE 42 19 599 C2 (DRABERT GMBH [DE]; VONHAUSEN ROBERT [DE]) 1 August 2002 (2002-08-01) * abstract; figures *	1	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	14 September 2021	Amghar, Norddin

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 17 5106

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-09-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010094470 A2	26-08-2010	AU 2010214841 A1	01-09-2011
		CA 2752430 A1	26-08-2010
		CN 102333466 A	25-01-2012
		DE 102009009287 A1	09-09-2010
		EP 2398355 A2	28-12-2011
		ES 2425088 T3	11-10-2013
		US 2012019035 A1	26-01-2012
		US 2014339870 A1	20-11-2014
		WO 2010094470 A2	26-08-2010
WO 9512338 A1	11-05-1995	AT 173591 T	15-12-1998
		AU 674801 B2	09-01-1997
		CA 2174511 A1	11-05-1995
		DE 69414878 T2	24-06-1999
		DK 0726723 T3	09-08-1999
		EP 0726723 A1	21-08-1996
		FI 961845 A	30-04-1996
		JP H09504218 A	28-04-1997
		KR 960705494 A	08-11-1996
		US 6431649 B1	13-08-2002
		WO 9512338 A1	11-05-1995
DE 9302581 U1	23-06-1994	NONE	
EP 1396213 B1	09-02-2005	AT 288694 T	15-02-2005
		DE 10241562 A1	18-03-2004
		DK 1396213 T3	02-05-2005
		EP 1396213 A1	10-03-2004
		ES 2236656 T3	16-07-2005
		US 2004140703 A1	22-07-2004
DE 4219599 C2	01-08-2002	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2009153811 A1 **[0004] [0006] [0014] [0060]**
- WO 2010097818 A1 **[0005] [0006] [0014]**