

(19)



(11)

EP 3 850 989 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.07.2021 Bulletin 2021/29

(51) Int Cl.:
A47C 7/40 (2006.01) A47C 7/44 (2006.01)

(21) Application number: **21151767.7**

(22) Date of filing: **15.01.2021**

(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
 Designated Extension States:
BA ME KH MA MD TN

(72) Inventors:
 • **Scagnellato, Paolo**
36024 Nanto (Vicenza) (IT)
 • **Ferrarese, Jeremiah**
36024 Nanto (Vicenza) (IT)
 • **Bertolini, Emanuele**
36024 Nanto (Vicenza) (IT)

(30) Priority: **16.01.2020 IT 202000000682**

(74) Representative: **Piovesana, Paolo**
c/o Praxi Intellectual Property S.p.A.- Venezia
Via Francesco Baracca, 5/A
30173 Venezia-Mestre (IT)

(71) Applicant: **Sitland S.P.A.**
36024 Nanto (IT)

(54) **CHAIR STRUCTURE WITH AN ELASTICALLY YIELDING BACKREST**

(57) Chair structure with elastically yielding backrest, comprising a first substantially rigid portion (8) of said backrest (4), constrained to a second substantially rigid portion (6) of a seat (2) by means of a connecting element (10), said connecting element (10) comprising a ball joint (12, 14) and a coupling pin (16) integral with one of the two substantially rigid portions (6, 8) to be connected together and engaging in the other, which presents a cavity (34) delimited by a wall (18) having a through hole (36) crossed by said coupling pin (16), characterized in that it comprises at least two elastic elements (20, 20',

22, 50, 52) maintained in a state of prestress, of which at least a first elastic element (20, 20') is arranged around said first coupling pin (16) and at least a second elastic element (22, 50, 52) is interposed between said connecting element (10) and said wall (18), the diameter of said coupling pin (16) being smaller than the diameter of said through hole (36) obtained in said wall (18) to an extent suitable to allow lateral inclinations of a predetermined entity of said pin (16) with respect to the axis of said hole (36).

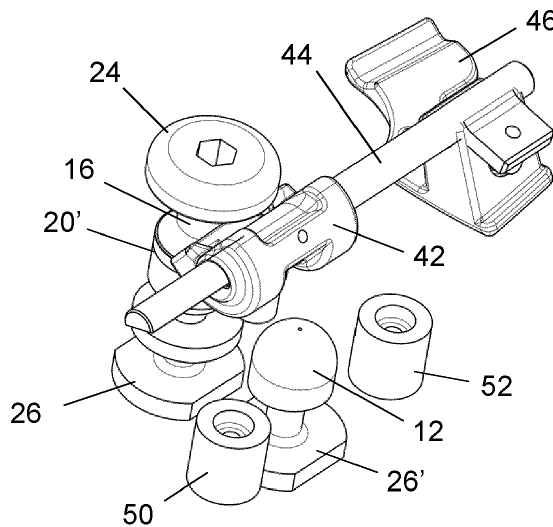


FIG. 7

EP 3 850 989 A1

Description

[0001] The present invention relates to a chair structure with an elastically yielding backrest.

[0002] Chairs are known comprising a support structure for a seat and a backrest, distinct from the seat and bound to it by means of a connecting and supporting element.

[0003] The seat can be rigidly bound to the support structure or it can be bound to it by means of an elastic joint, which allows the seat to oscillate in both longitudinal and transverse directions.

[0004] In the case of constraint of the seat to the basic structure of the chair by means of an elastic joint, if the backrest is rigidly constrained to the seat, the elastic yielding of the latter also entails an elastic yielding of the backrest following stresses imparted by the user sitting on the chair. In the case of rigid constraint of the seat to the basic structure of the chair, the possibility of elastic yielding of the backrest occurs only if this is bound to the seat or to the basic structure of the chair by means of an elastic joint.

[0005] CN 108294516 describes a chair with backrest that can be tilted backwards with respect to the seat exclusively on the longitudinal vertical plane thanks to a connection between the two obtained by means of a spherical joint and a connecting member distinct from the spherical joint and wrapped in an elastic sleeve which tends to reset the backrest in an upright condition when the stress that had caused it to tilt ceased.

[0006] The object of the invention is to provide a chair structure with a backrest separated from the seat and bound to it by an elastic joint.

[0007] Another object of the invention is to provide a chair structure, in which the backrest can be attached to the seat regardless of whether the latter is rigidly or elastically yielded to its base structure.

[0008] Another object of the invention is to provide a chair structure in which the elastic yielding of the backrest with respect to the seat can take place in any direction.

[0009] Another object of the invention is to provide a chair structure, in which the elastic yielding of the backrest with respect to the seat can be locked and restored on command.

[0010] Another object of the invention is to provide a chair structure, in which the degree of elastic compliance can be at least partially adjusted.

[0011] Another object of the invention is to provide a chair structure, in which all or at least part of the objectives indicated above can be achieved in a simple way with reliable operation and with reduced costs.

[0012] All these objects and others which will result from the following description are achieved, according to the invention, with a chair structure with elastically yielding backrest as defined in claim 1.

[0013] The present invention is further clarified hereinafter in some of its preferred forms of practical embodiments reported for purely illustrative and non-limiting

purposes with reference to the attached drawing tables, in which:

- 5 Figure 1 shows a partially sectioned side view of a chair structure according to the invention in a first embodiment,
- Figure 2 shows the same view the enlarged detail of the connecting element between the backrest and the seat,
- 10 Figure 3 schematically shows in perspective view and in the deactivated condition the detail of the device for locking the movements of the backrest with respect to the seat in the first embodiment, and
- 15 Figure 4 shows the same particularly in the activated condition,
- Figure 5 shows in plan and in a second embodiment a detail of the chair structure according to the invention,
- 20 Figure 6 shows it according to the partial longitudinal section VI-VI of figure 5,
- Figure 7 schematically shows in perspective view and in the deactivated condition the detail of the device for locking the movements of the backrest with respect to the seat in this second embodiment;
- 25 Figure 8 shows it according to the cross section VIII-VIII of figure 5.

30 **[0014]** As can be seen in the figures, the chair structure according to the invention comprises a seat 2 and a backrest 4.

[0015] More particularly, the chair structure with an elastically yielding backrest according to the invention comprises a first substantially rigid portion 6 of the seat 2, constrained to a second substantially rigid portion 8 of the backrest 4 by means of a connecting element 10.

[0016] As will be described in greater detail below, the connecting element 10 suitably comprises a front spherical joint 12, 14 and a rear coupling pin 16.

[0017] The coupling pin 16 is advantageously integral with one of the two elements 6, 10 to be connected together, and in particular to the portion 6 of the seat 2.

[0018] The chair structure also advantageously comprises a wall 18, which is present in the other element 10, 6, in this case the connecting element 10 and is crossed by the pin 16.

[0019] In accordance with a first embodiment of the present invention, two elastic elements 20, 22 are applied to both sides of the wall 18 to the pin 16, kept in a state of prestress. Both are mounted on the pin 16 and of these the upper element 20 is interposed between an upper bushing 24, screwed to a threaded portion of the pin 16, and the upper surface of the wall 18, while the lower one 22 is interposed between the lower wall of the same wall 18 and a bar 26, which is embedded in the connection element 10 and has the coupling pin 16 applied. More particularly, the lower elastic element 22 is housed at

least partially within a corresponding cavity obtained in the connection element 10.

[0020] An upper padding 30 is preferably applied to the first substantially rigid portion 6 or body of the seat 2, while another padding (not shown) is preferably applied to the second substantially rigid portion 8 of the backrest 4.

[0021] The body 6 of the seat 2 is provided with suitable means, not forming part of the invention, for the rigid or elastically yielding connection to a lower base structure, not shown here, for supporting and resting on the floor.

[0022] In the rear part of the body 6 of the seat 2 there is a block 32 for attachment of the connecting element 10 to the backrest 4. It is preferably made of aluminum and can be fixed to the body 6 or can be made in a single body with it. The attachment block 32 presents a first internal cavity 34, separated from the outside by the wall 18, in which a through hole 36 is made, and is also affected by a second cavity 14, having a substantially cylindrical shape with a hemispherical bottom, positioned anteriorly with respect to the cavity 34 and constituting the female element of the ball joint.

[0023] In other words, the first substantially rigid portion 6 of said seat portion 2 advantageously comprises in its rear part the block 32, presenting the cavity 34 closed by the wall 18, in which is formed the hole 36 crossed by the coupling pin 16.

[0024] The connection element 10 between the shell 6 of the seat 2 and the shell 8 of the backrest 4 has an essentially arched conformation, with an upper portion 38, intended to be rigidly constrained to the shell 8 of the backrest 4 and with a lower portion 40, intended to be constrained in an elastically yielding manner to the block 32 for attachment of the backrest 4 to the body 6 of the seat 2.

[0025] The bar 26 is incorporated and/or embedded in the lower portion 40 of the connection element 10, to which, in addition to being fixed the lower end of the coupling pin 16, the male element 12 of the ball joint can also be advantageously fixed, which is housed in the cavity 14 obtained in block 32.

[0026] With particular reference to the first embodiment illustrated in the attached figures 1 - 4, the coupling pin 16 and the male element 12 are constrained to a single bar 26 incorporated in the connection element 10.

[0027] As an alternative to what is illustrated with reference to the first embodiment, the coupling pin 16 and the male element 12 of the ball joint 12, 14 can be fixed to two distinct bars 26, 26', both housed or incorporated in the connection element 10, as it will be better described with reference to the second embodiment.

[0028] The diameter of the coupling pin 16 is smaller than the diameter of the hole 36 obtained in the wall 18, to an extent suitable for allowing a certain play within the hole 16 itself and consequent lateral movements thereof of a corresponding amount.

[0029] Conveniently, the spherical joint 12, 14 comprises a female element, consisting of the spherical cavity

14 obtained in the substantially rigid portion 6 of the seat 2, and the male element 12, which is constrained to a bar 26, 26' incorporated in the connection 10 and is provided with a spherical portion 12 engaged in the spherical cavity 14.

[0030] Advantageously, both elastic elements 20, 22 are constituted by polymeric springs made of elastically yielding plastic material. They have a preferably cylindrical shape and are housed in the corresponding seats so as to be both in a state of prestress and to exert their elastic reaction on the block 32 on both sides of its wall 18.

[0031] Preferably, the first elastic element 20, 20' has a substantially cylindrical shape and presents an axial cavity crossed by the coupling pin 16. More in detail, the first elastic element 20, 20' is housed at least partially within seats having a complementary shape. Preferably, one of these seats is formed in the internal cavity 34 of the substantially rigid portion 6 of the seat 2, and the other is formed in the external wall of the substantially rigid portion 6 of the seat 2 or in the connecting element 10 or partially in both.

[0032] Advantageously, the spherical joint 12, 14 is located in a more advanced position with respect to the first coupling pin 16.

[0033] Conveniently at least the free end of the coupling pin 16 is threaded and is engaged by a bushing 24 for axial compression of the polymer springs 20, 22.

[0034] In the condition of assembled chair structure, the connecting element 10 is constrained to the body 6 of the seat 2 following the insertion of the coupling pin 16 in the two polymeric springs 20, 22 and in the through hole 36 of the interposed wall 18 of the block 32, and of its subsequent locking in this condition with the bushing 24, which engages the threaded portion of the pin 16 and, depending on the degree of screwing, more or less compresses the polymer springs 20, 22, thus adjusting their degree of elastic response.

[0035] Still in the assembled chair structure condition, the male element 12 of the ball joint engages the female element 14 of the joint itself and keeps this engagement configuration stable.

[0036] In use, after the correct screwing of the bushing 24 has preloaded the two polymeric springs 20, 22 in the desired manner, any backward thrust on the backrest 4 exerted by the user sitting on the chair determines the backward inclination of the backrest itself with fulcrum on the ball joint 12, 14.

[0037] This inclination is allowed by the elastic yielding upon compression of the upper polymeric spring 20 and can occur mainly on the longitudinal plane of the chair although it can often also occur simultaneously on the longitudinal plane and on the transverse plane and can also have a rotational component, all being allowed from the play provided by the difference in diameter between the coupling pin 16 and the hole 36 obtained in the wall 18 of the attachment block 32.

[0038] Obviously, when the stress applied to the backrest 4 ceases, the elastic reaction of the upper polymeric

spring 20 brings the backrest back into the rest position.

[0039] On the other hand, in the case of lateral inclination of the backrest 4 with respect to the seat 2 or in the more frequent case of inclination of the backrest backwards accompanied also by a lateral inclination, this lateral component is absorbed and contrasted by the elastic compliance in the radial direction of the two polymer springs 20, 22.

[0040] It is also advantageously provided that the articulation between the backrest 4 and the seat 2 can be locked if it is desired to make the backrest 4 rigid with respect to the seat 2.

[0041] This can be obtained by making the bushing 24 with a lateral cavity 48 which can be engaged with the shape coupling by of an eccentric 42.

[0042] This eccentric 42 is integral with a shaft 44 mounted at the end of a lever 46 which can be rotated by the user and extends over an arc of an amplitude correlated to the configuration of the bushing 24, in the sense that for a certain angular position of the eccentric 42 this engages the concave cavity 48 of the bushing 24 with shape coupling, while for a different rotational position it is decoupled from this.

[0043] In the disengaged condition (fig. 3), the coupling pin 16 is free to move axially following a backward push of the backrest 4. However, if the user sitting on the chair acts on the lever 46, in the sense of causing the rotation of the shaft 44, this maneuver determines the insertion of the eccentric 42 into the cavity 48 obtained in the bushing 24 (fig. 4). Following this insertion, the axial movements of the coupling pin 16, and consequently the backward inclination of the backrest 4, are blocked. If the eccentric 42 has a concave transverse profile, that is, it is advantageously configured in such a way as to embrace the bushing also laterally itself when it engages its cavity 48, it is capable of preventing not only the axial movements of the coupling pin 16, but also its lateral movements within the hole 36, and therefore of completely blocking any movement of the backrest with respect to the seat 2.

[0044] In accordance with a second embodiment of the present invention, illustrated in Figures 5 - 8, the chair structure comprises at least two second elastic elements 50, 52 located in a more advanced position with respect to the coupling pin 6 and substantially symmetrical with respect to the longitudinal median plane of the structure itself.

[0045] Conveniently, the elastic elements comprise at least three polymeric springs 20', 50, 52, of which at least one first polymeric spring 20' is arranged around the coupling pin 16 and is equivalent to the spring 20 of the previous embodiment, while the other two second springs 50, 52 are interposed between the terminal part 40 of the connection element 10 and the block 32 and are preferably fixed by means of screws 54 to the connection element itself, advantageously in a symmetrical position with respect to the male element 12 which belongs to the spherical joint and which can alternatively be integral with the same bar 26, to which the coupling pin 16 is also

integral, as illustrated for example with reference to the first embodiment, or with a different bar 26', which in any case is constrained to the connection element 10.

[0046] Preferably the two second polymeric springs 50, 52 are partially housed in the connecting element 10 and in part in the attachment block 32; moreover it is preferable that the screws 54, which constrain each second polymeric spring 50, 52 in the respective seat in the connecting element 10, are configured to adjust the prestress of the springs themselves.

[0047] Advantageously, the polymeric springs 50, 52 are arranged in proximity to the transverse plane passing through the spherical joint 12, 14.

[0048] The operation of the chair structure according to the invention in this second embodiment is similar to the operation of the first embodiment as regards the locking system of the backrest joint 4 with respect to the seat 2 and the elastic reaction to the inclination of the backrest 4 backwards, but it differs from that in the way in which the elastic reaction to the lateral inclination of the backrest 4 backwards takes place, since in this case it is essentially due to the compression of one or the other second polymeric spring 50, 52.

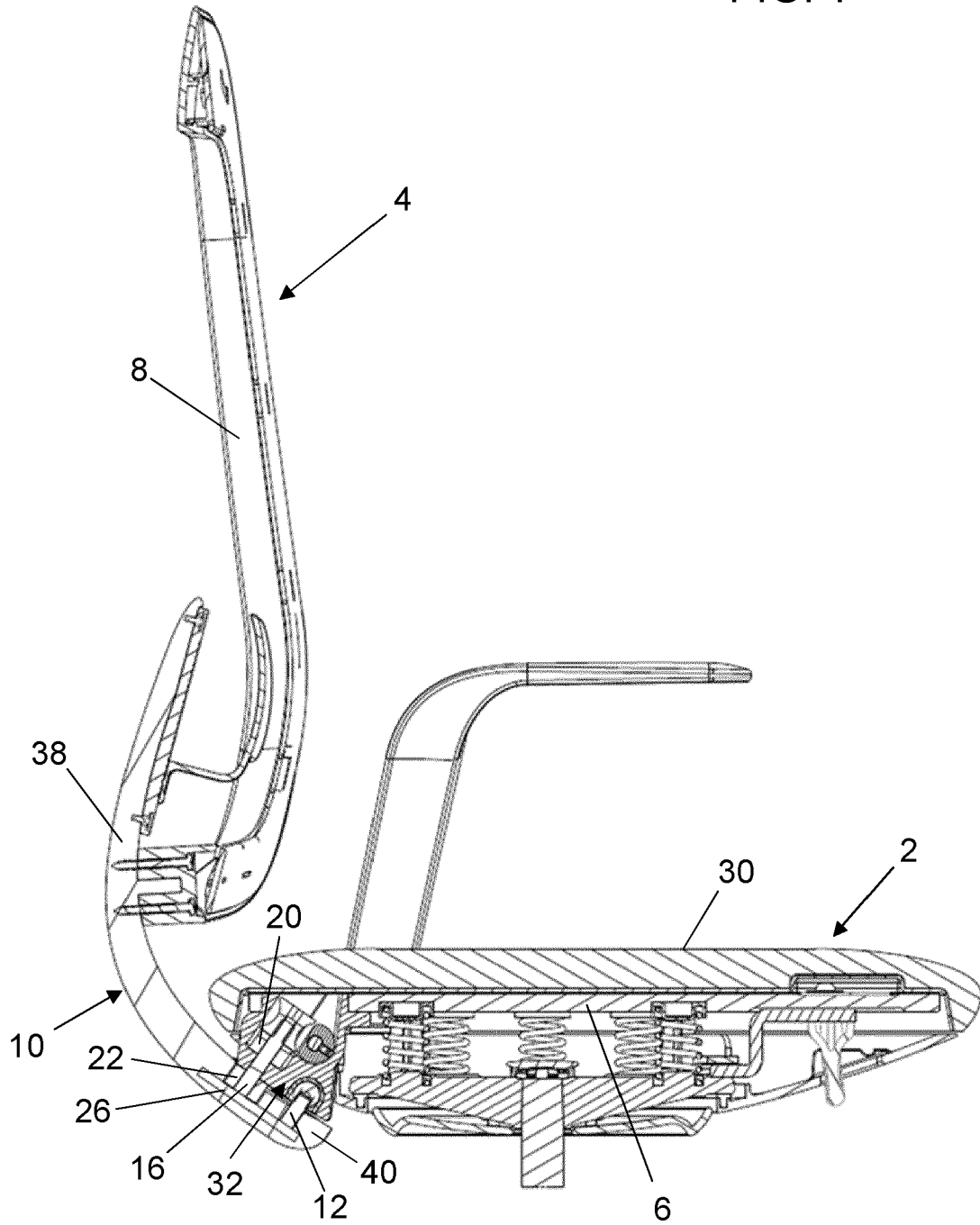
[0049] While for the purposes of the elastic reaction of the lateral inclination of the backrest 4 it is appropriate that the axes of the two springs 50, 52 and of the male element 12 of the ball joint lie on the same transverse plane, reasons linked to the practicality of assembly of the structure sometimes suggest to keep the plane passing through the axes of the two second springs 50, 52 in a slightly more advanced position, since this slightly advanced positioning does not in practice change the overall behavior of the structure.

Claims

1. Chair structure with elastically yielding backrest, comprising a first substantially rigid portion (8) of said backrest (4), constrained to a second substantially rigid portion (6) of a seat (2) by means of a connecting element (10), said connecting element (10) comprising a ball joint (12, 14) and a coupling pin (16) integral with one of the two substantially rigid portions (6, 8) to be connected together and engaging in the other, which presents a cavity (34) delimited by a wall (18) having a through hole (36) crossed by said coupling pin (16), **characterized in that** it comprises at least two elastic elements (20, 20', 22, 50, 52) maintained in a state of prestress, of which at least a first elastic element (20, 20') is arranged around said first coupling pin (16) and at least a second elastic element (22, 50, 52) is interposed between said connecting element (10) and said wall (18), the diameter of said coupling pin (16) being smaller than the diameter of said through hole (36) obtained in said wall (18) to an extent suitable to allow lateral inclinations of a predetermined entity of said pin (16) with respect to

- the axis of said hole (36).
2. Chair structure according to claim 1 **characterized in that** said first elastic elements (20, 20') and/or said second elastic elements (22, 50, 52) are constituted by polymeric springs made of elastically yielding plastic material. 5
 3. Chair structure according to one or more of the preceding claims, **characterized in that** said ball joint (12, 14) is located in a more advanced position with respect to said first coupling pin (16). 10
 4. Chair structure according to one or more of the preceding claims **characterized in that** said spherical joint (12, 14) comprises a female element, consisting of a spherical cavity (14) obtained in said substantially rigid portion (6) of seat (2), and a male element (12), which is attached to a bar (26, 26') incorporated in said connection element (10) and is provided with a spherical portion (12) engaged in said spherical cavity (14). 15
 5. Chair structure according to one or more of the preceding claims, **characterized in that** said coupling pin (16) and said male element (12) are constrained to a single bar (26) incorporated in said connecting element (10). 20
 6. Structure according to one or more of the preceding claims **characterized in that** said first substantially rigid portion (6) of said seat (2) has a block (32) applied in its rear part, in which said cavity (34) and the female element (14) of said spherical joint (12, 14). 25
 7. Chair structure according to one or more of the preceding claims, **characterized in that** said first elastic element (20, 20') has a substantially cylindrical shape and presents an axial cavity crossed by said coupling pin (16). 30
 8. Chair structure according to one or more of the preceding claims, **characterized in that** said second elastic element (22) has a substantially cylindrical shape, presents an axial cavity crossed by said coupling pin (16) and is housed at least partially within seats having a complementary shape, one of said seats being formed in the internal cavity (34) of said substantially rigid portion (6) of said seat (2), and the other being formed in the external wall of said substantially rigid portion (6) of said seat (2) or in said connecting element (10) or partially in both. 35
 9. Chair structure according to one or more of the preceding claims, **characterized in that** it comprises at least two second elastic elements (50, 52) located in a more advanced position with respect to said coupling pin (6) and substantially symmetrical with respect to the longitudinal median plane of the structure itself. 40
 10. Chair structure according to claim 8 **characterized in that** said second elastic elements (50, 52) consist of substantially cylindrical polymeric springs housed partly in corresponding cavities obtained in said seating structure (2) and partly in corresponding cavities obtained in said connection element (10), to which said polymeric springs are fixed by means of screws (54) passing through axial holes obtained in the body of the springs themselves. 45
 11. Chair structure according to claim 10 **characterized in that** said polymeric springs (50, 52) are arranged in proximity to the transverse plane passing through said spherical joint (12, 14). 50
 12. Chair structure according to one or more of the preceding claims, **characterized in that** at least the free end of said coupling pin (16) is threaded and is engaged by an axial compression bushing (24) of said elastic elements (20, 20', 22) placed around said coupling pin (16). 55
 13. Chair structure according to one or more of the preceding claims, **characterized in that** said bushing (24) is affected on its lateral surface by a cavity (48) removably engageable by an eccentric element (42) complementary thereto, bound to the first portion substantially rigid (6) of said seat (2) to prevent axial movements of said coupling pin (16) with respect to said substantially rigid portion (6) of seat (2) when engaged in said cavity (48). 60
 14. Chair structure according to claim 13, **characterized in that** said eccentric element (42) and said lateral cavity (48) of said bushing (24) are configured so that when said eccentric (42) engages said lateral cavity (48) it embraces said bushing (24) to such an extent as to prevent said coupling pin (16) not only from axial movements but also from inclinations of its axis. 65
 15. Chair structure according to one or more of the preceding claims, **characterized in that** said eccentric element (42) is mounted on a spindle (44) drivable in rotation from the outside of said first substantially rigid portion (6) of said seat cushion (2). 70

FIG. 1



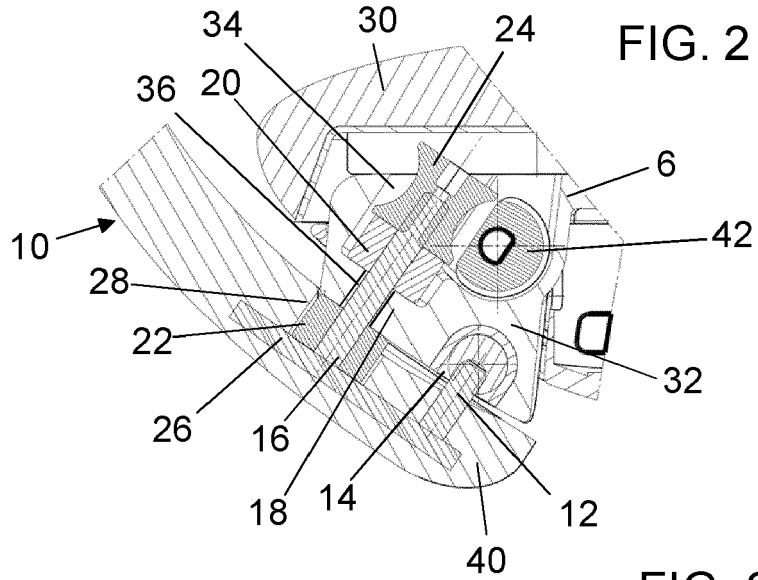


FIG. 3

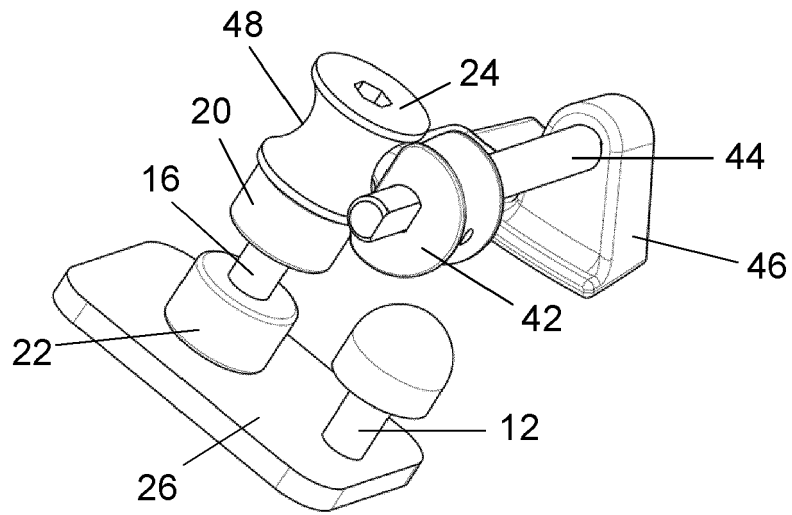
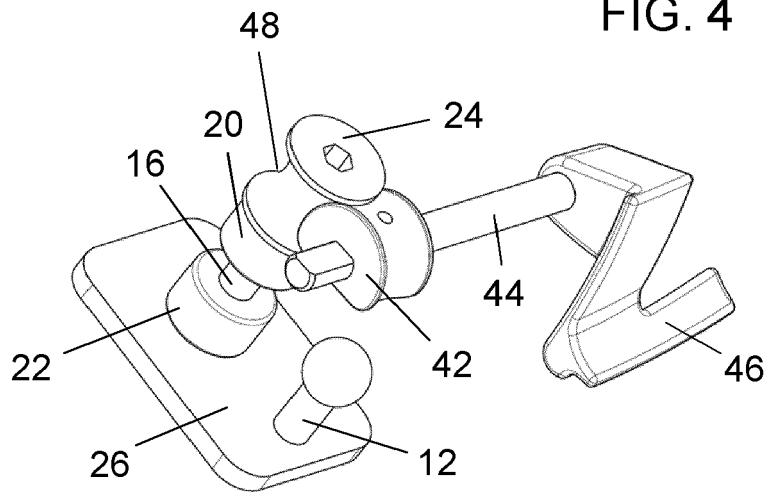


FIG. 4



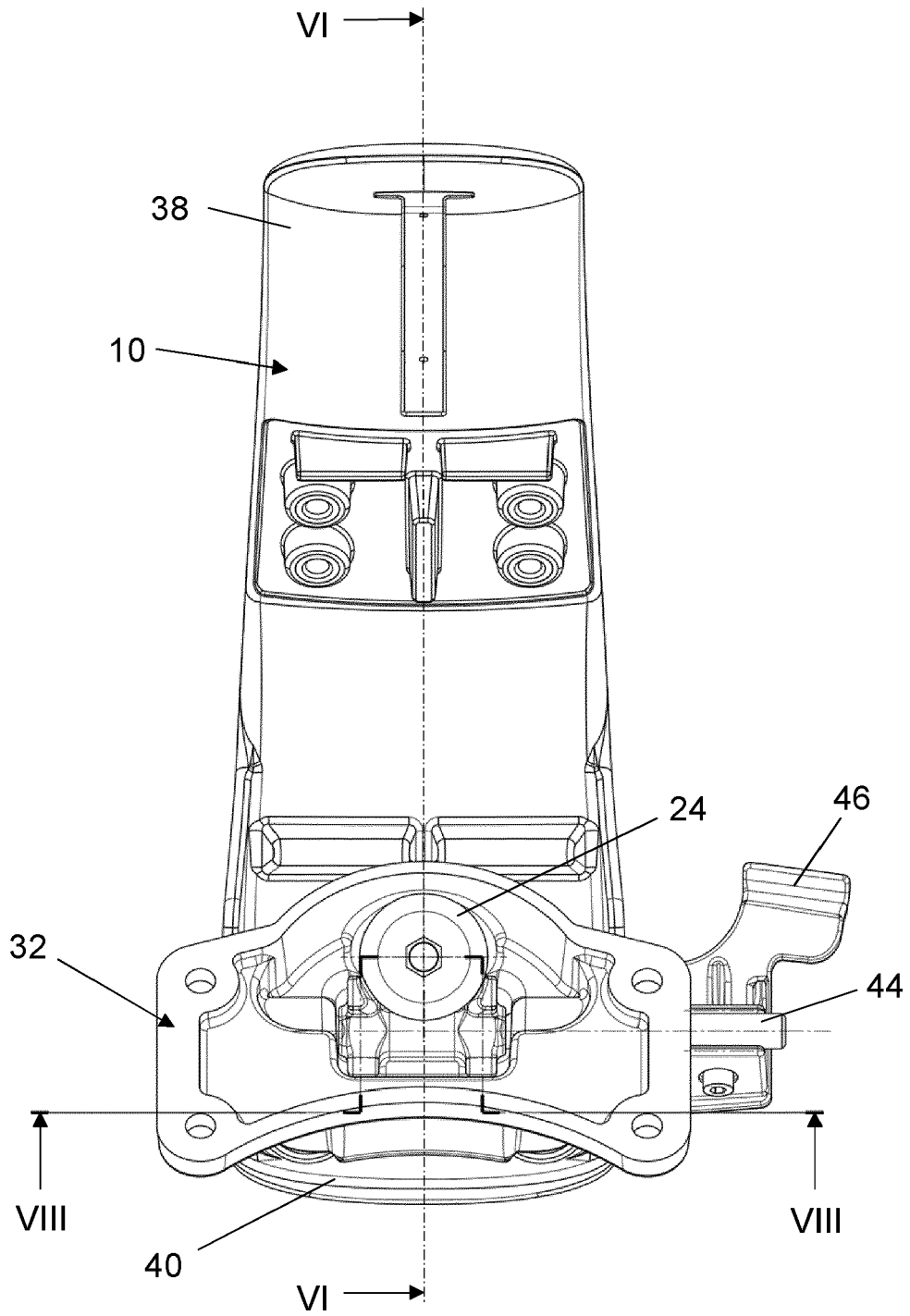


FIG. 5

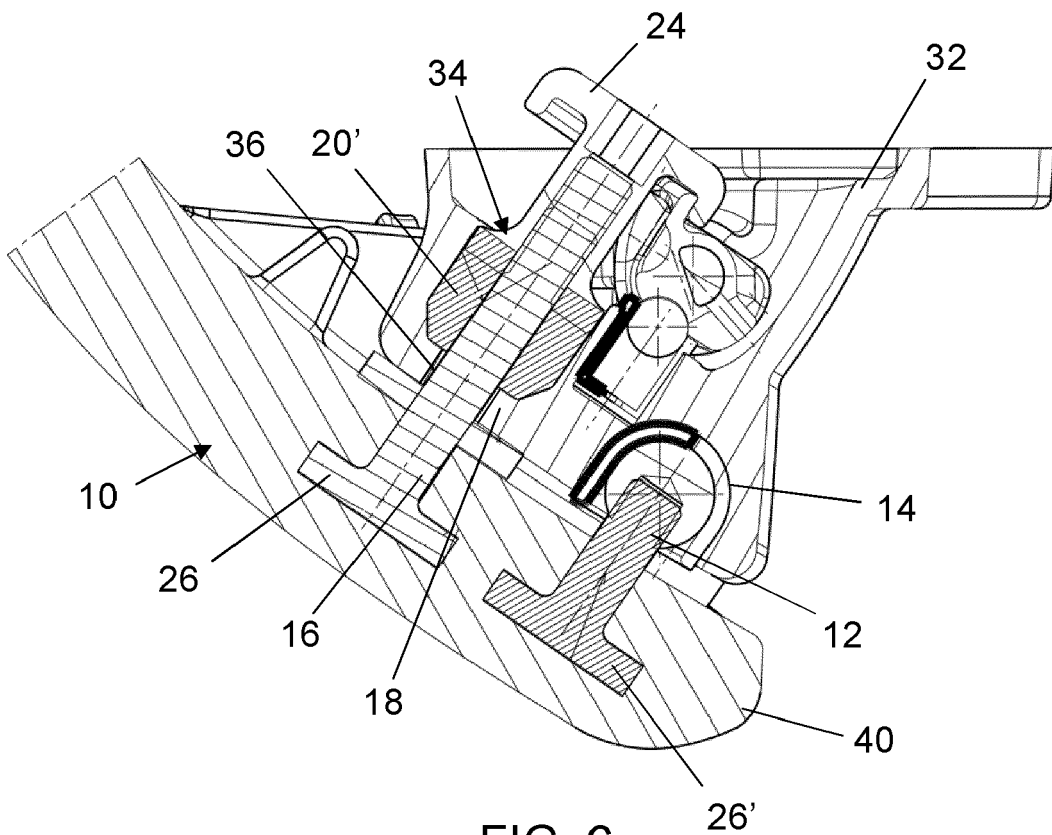


FIG. 6

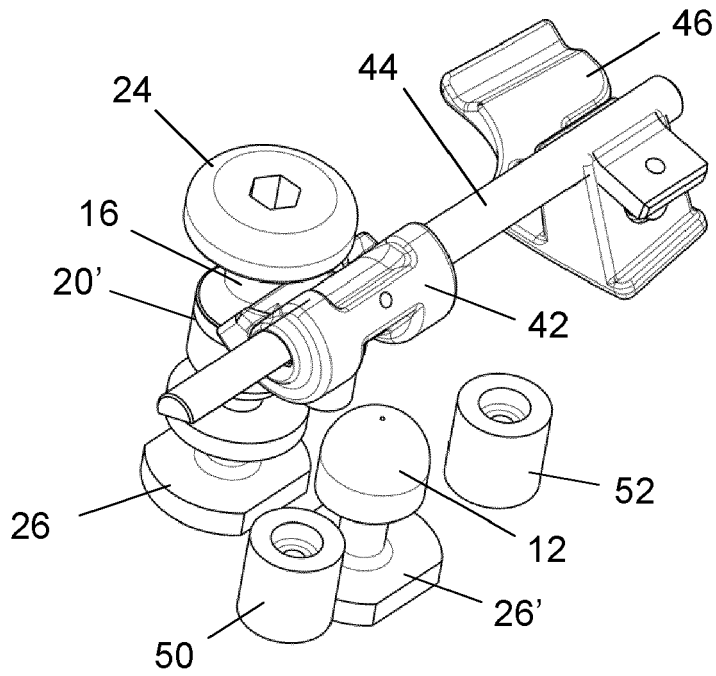


FIG. 7

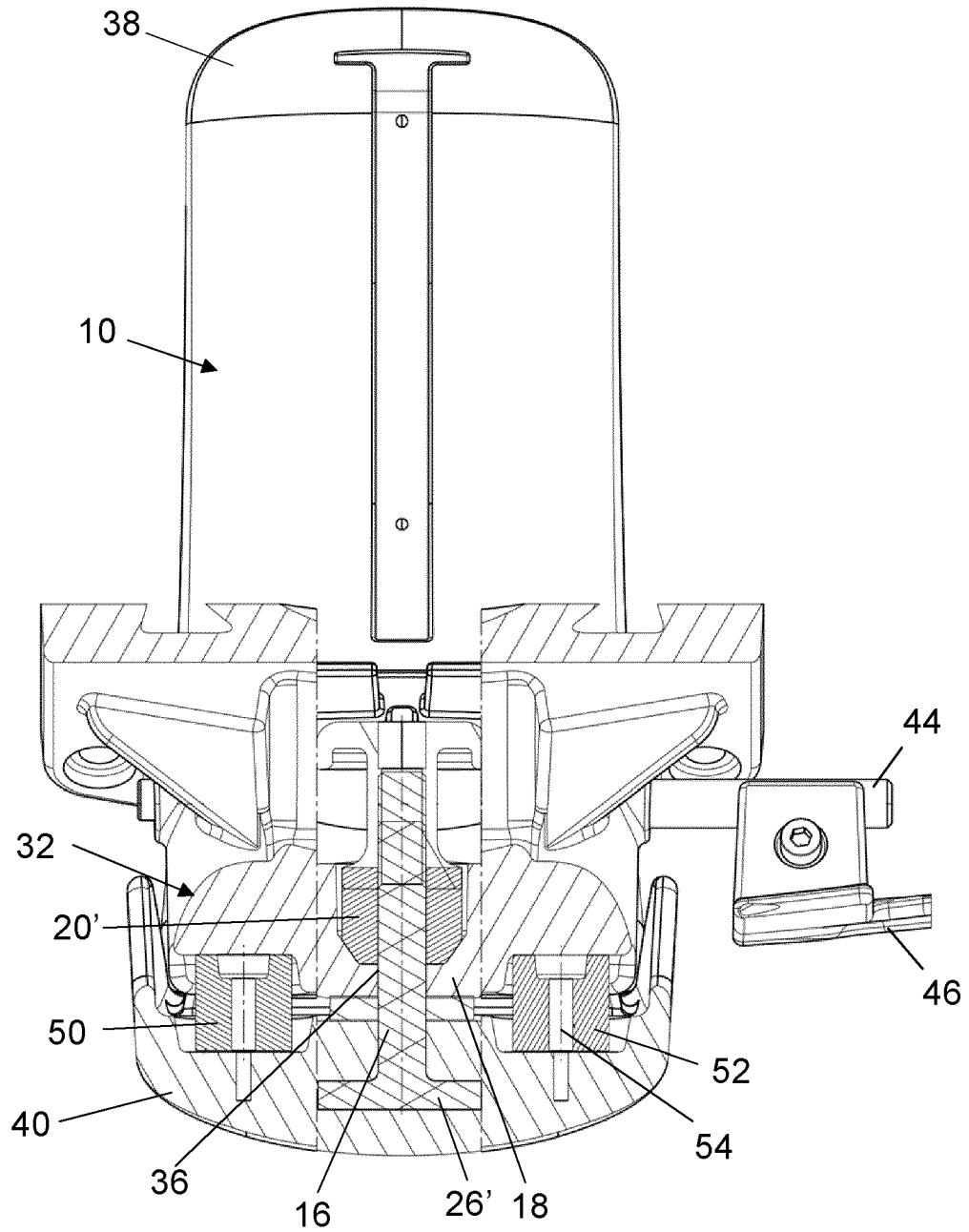


FIG. 8



EUROPEAN SEARCH REPORT

Application Number
EP 21 15 1767

5

10

15

20

25

30

35

40

45

50

55

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	CN 108 294 516 A (HANGZHOU DINGHUI HOME TECH CO LTD) 20 July 2018 (2018-07-20) * Claims 1-6 of the machine translation and following passage in description "The connecting rod 9 penetrates into the inner side of the seat portion 1 and is provided with a flexible block 10. The seat portion 1 is provided with a receiving groove 11 for preventing the flexible block 10 from leaving the seat portion 1"; figures *	1-4,7,12 5,6, 8-11, 13-15	INV. A47C7/40 A47C7/44
A	----- EP 0 308 538 A1 (STOLL KG CHRISTOF [DE]) 29 March 1989 (1989-03-29) * column 4, lines 26-36; claims 1,6,10; figures * -----	1,9,10	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 May 2021	Examiner 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	

1
EPO FORM 1503 03.82 (P04C01)

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

EP 21 15 1767

5 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.

20-05-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 108294516 A	20-07-2018	NONE	

EP 0308538 A1	29-03-1989	AT 70415 T	15-01-1992
		DE 8717656 U1	14-09-1989
		EP 0308538 A1	29-03-1989

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

- CN 108294516 [0005]