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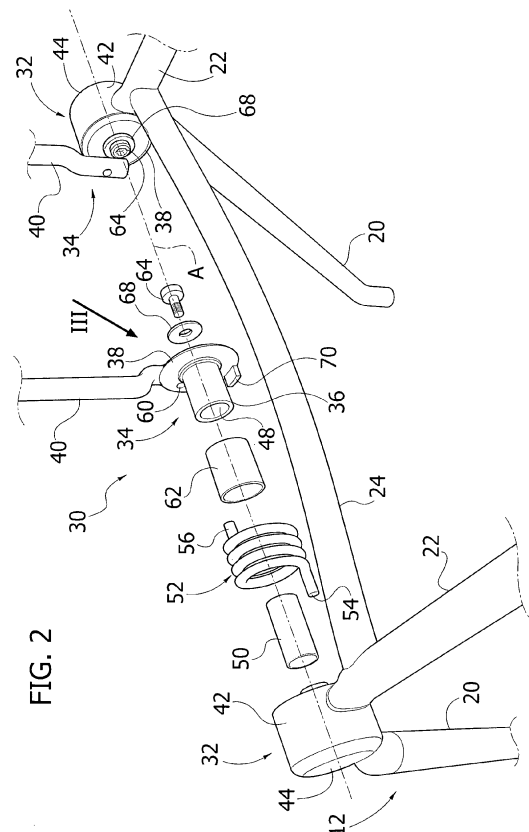
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(54) **A chair with tilting backrest**

(57) A chair comprising:

- a base structure (12);
- a seat (14), carried by the base structure (12);
- a backrest (16), comprising two lateral uprights (26) connected to a resting portion (28), the backrest (16) being articulated to the base structure (12) about a horizontal axis (A) and being mobile between a resting position and a position reclined backwards; and
- an elastic mechanism (30), arranged for pushing the backrest (16) elastically towards said resting position, wherein the elastic mechanism (30) comprises:
 - two hubs (32) fixed with respect to the base structure (12) and set at a distance from one another along said axis of articulation (A);
 - two rotating members (34), which engage the respective hubs (32) in such a way that they can turn about said axis of articulation (A), each of said rotating members (34) being fixed to a bottom end of a respective upright (26); and
 - two helical springs (52) set coaxially to said axis of articulation (A), each of said helical springs (52) having a first end (54) fixed to a respective hub (32) and a second end (56) fixed to a respective rotating member (34).



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Description

Background of the invention

[0001] The present invention relates to a chair comprising a base structure, a seat carried by the base structure, a backrest articulated to the base structure about a horizontal axis, and an elastic mechanism set between the base structure and the backrest for pushing the backrest elastically towards a resting position.

[0002] In chairs of this type, the backrest can be reclined backwards, against the return force of the elastic mechanism, by the thrust applied by the user's back and returns into the resting position when the thrust backwards applied by the user ceases.

Description of the relevant art

[0003] The document No. EP-A-0626146 filed in the name of the present applicant describes a chair with tilting backrest having the characteristics specified in the preamble of Claim 1. In this chair, torsion-spring means are provided, which push the backrest towards its resting position. The torsion-spring means comprise an elongated torsion element set along the axis of articulation of the backrest to the base structure. The torsion element is set within a transverse tubular member fixed to the base structure.

Object and summary of the invention

[0004] The object of the present invention is to provide a chair with tilting backrest of the type indicated above that will be lighter both from the purely physical standpoint and from the aesthetic standpoint.

[0005] According to the present invention, the above object is achieved by a chair having the characteristics that form the subject of Claim 1.

[0006] Preferred embodiments of the invention form the subject of the dependent claims.

[0007] The claims form an integral part of the teaching provided herein in relation to the invention.

Brief description of the drawings

[0008] The present invention will now be described in detail with reference to the attached drawings, which are provided purely by way of non-limiting example, and in which:

- Figure 1 is a perspective view of a first embodiment of a chair according to the present invention;
- Figure 2 is a partially exploded perspective view of the part indicated by the arrow II in Figure 1;
- Figure 3 is an exploded perspective view from a different angle of the part indicated by the arrow III in Figure 2;
- Figure 4 is a partially exploded perspective view of

the part indicated by the arrow IV in Figure 1;

- Figure 5 is a view from a different angle of the part indicated by the arrow III in Figure 2;
- Figure 6 is a perspective view of a second embodiment of a chair according to the invention;
- Figure 7 is an exploded perspective view of the part indicated by the arrow VII in Figure 6; and
- Figure 8 is an exploded perspective view from a different angle of the part indicated by the arrow VIII in Figure 7.

Detailed description of embodiments of the invention

[0009] With reference to Figure 1, designated by 10 is a chair according to the present invention. The chair 10 comprises a base structure 12, carrying a seat 14 and a backrest 16. In the embodiment illustrated, the base structure 12 comprises two front legs 18 and two rear legs 20. As may be seen in Figures 2 and 3, the front leg 18 and the rear leg 20 on the same side of the chair 10 are joined to one another by means of a longitudinal element 22. A transverse element 24 joins the longitudinal elements 22 together in the rear part of the chair. Preferably, the legs 18, 20, the longitudinal elements 22, and the transverse element 24 are constituted by bent metal tubular members that are connected to one another by welding. The shape illustrated of the base structure 12 is not, however, imperative, and it is understood that the base structure 12 may assume other shapes.

[0010] The seat 14 can be constituted by a shaped panel made of injection-moulded plastic material fixed to the base structure 12 by coupling by snap-action, using screws, or in any other way.

[0011] The backrest 16 comprises two lateral uprights 26 that carry an arched resting portion 28. Preferably, the uprights 26 and the resting portion 28 are formed in a monolithic way by means of injection moulding. The uprights 26 preferably have a tubular shape open downwards. The backrest 16 is articulated to the base structure 12 about a horizontal transverse axis A in the way that will be described in what follows.

[0012] The backrest 16 can oscillate about the axis A between a resting position and a position reclined backwards. As will be described better in what follows, the backrest 16 is subjected to an elastic return force that tends to keep it in the resting position and can be reclined backwards under the action of a thrust backwards applied by the user's back.

[0013] With reference to Figures 2 and 3, the chair 10 comprises an elastic mechanism 30, arranged for pushing the backrest 16 elastically towards its resting position. The elastic mechanism 30 comprises two hubs 32 fixed with respect to the base structure 12 and set at a distance from one another in transverse direction along the axis of articulation A. In the example illustrated in Figures 2 and 3, each hub 32 is fixed, for example by welding, to the longitudinal element 22 and to the rear leg 20 of the respective side of the chair.

[0014] The elastic mechanism 30 comprises two rotating members 34 coupled in an oscillating way to the respective hubs 32 about the axis A. In the embodiment illustrated in Figures 2 and 3, each rotating member 34 has a tubular portion 36 with an axial hole 48 and a disk-shaped flange 38 fixed to one end of the tubular portion 36.

[0015] The rotating members 34 are fixed to the bottom ends of the respective uprights 26 of the backrest 16. In the example illustrated, said fixing is provided by means of respective coupling rods 40, each of which is fixed to the respective disk-shaped flange 38 and is inserted and clamped in the respective upright 26 of the backrest 16.

[0016] With reference in particular to Figure 3, each hub 32 has a cylindrical wall 42, a front wall 44, and a pin 46, which extends in cantilever fashion from the bottom wall 44 coaxially to the axis of articulation A. The pin 46 of each hub 32 is inserted in the axial hole 48 of a respective rotating member 34. Preferably, a bushing 50 made of a material with low coefficient of friction is set between the external surface of the pin 46 and the internal surface of the hole 48.

[0017] With reference to Figures 2 and 3, the elastic mechanism 30 comprises two helical springs 52 set coaxially to the axis of articulation A. Each helical spring 52 extends on the outside of the tubular portion 36 of the respective rotating member 34. Each helical spring 52 has a first end 54 fixed to the respective hub 32 and a second end 56 fixed to the respective rotating member 34. The ends 54, 56 are preferably bent in a direction parallel to the axis A and fit within respective holes 58, 60 provided on the hub 32 and on the rotating member 34. Preferably, a second bushing 62 is set between each helical spring 52 and the external surface of the respective tubular portion 36.

[0018] Each rotating member 34 is connected to the respective hub 32 by means of a screw 64, which extends through an axial hole of the respective disk-shaped flange 38 and engages a threaded hole 66 of the pin 46. A washer 68 is preferably set between the head of the screw 64 and the external front surface of the respective disk-shaped flange 38.

[0019] The elastic mechanism 30 includes an end-of-travel device that defines the resting position and the position of maximum inclination backwards of the backrest 16. With reference in particular to Figure 5, said end-of-travel device is provided by means of a tooth 70, projecting axially and fixed with respect to each disk-shaped flange 38, which engages a respective slit 72 formed in the side wall 42 of the respective hub 32. The slit 72 has an angular amplitude greater than that of the tooth 70. The resting position and the position of maximum inclination backwards of the backrest are defined by the positions of bearing of the tooth 70 upon the opposed ends of the groove 72.

[0020] In the embodiment illustrated in Figures 1 to 5 the fixed hubs 32 are located in an external position, in a transverse direction, with respect to the rotating mem-

bers 34, and the uprights 26 of the backrest 16 are shifted inwards with respect to the external lateral edges of the seat 14. Consequently, as illustrated in Figure 4, the coupling bars 40 that connect the uprights 26 of the backrest 16 to the rotating members 34 extend through respective through slits 74 formed in the rear part of the seat 14. The angular amplitude of the slits 74 is greater than the angle of inclination of the backrest 16.

[0021] Figures 6 to 8 illustrate a second embodiment of a chair according to the present invention. The elements corresponding to the ones described previously are designated by the same reference numbers.

[0022] In the variant illustrated in Figures 6 to 8 the rotating members 34 connected to the backrest 16 are set in an outer position in a direction transverse with respect to that of the hubs 32.

[0023] With reference in particular to Figures 7 and 8, each rotating member 34 has a cylindrical wall 42 and a connection rod 40, which extends, preferably in an integral way, from the cylindrical wall 42. The connection rod 40 fits within a respective upright 26 of the backrest 16. Each rotating member 34 has a bottom wall 44 extending from which is an axial pin 46, which fits within a hole 48 of a tubular portion 36 of a respective hub 32. Each hub 32 has a disk-shaped flange 38, which is fixed, for example by means of welding, to a corresponding longitudinal element 22 of the base structure 12. As in the version described previously, a screw 64 engages a threaded hole 66 formed in the pin 46 of the respective rotating member 34 for connecting each rotating member 34 axially to the respective hub 32.

[0024] As in the embodiment described previously, the elastic mechanism 30 comprises two helical springs 52 each of which has a first end 54 fixed to the respective hub 32 and a second end 56 fixed to the respective rotating member 34. Also in this case, an end-of-travel device is provided, made in a way similar to what has been described previously with reference to Figure 5.

Claims

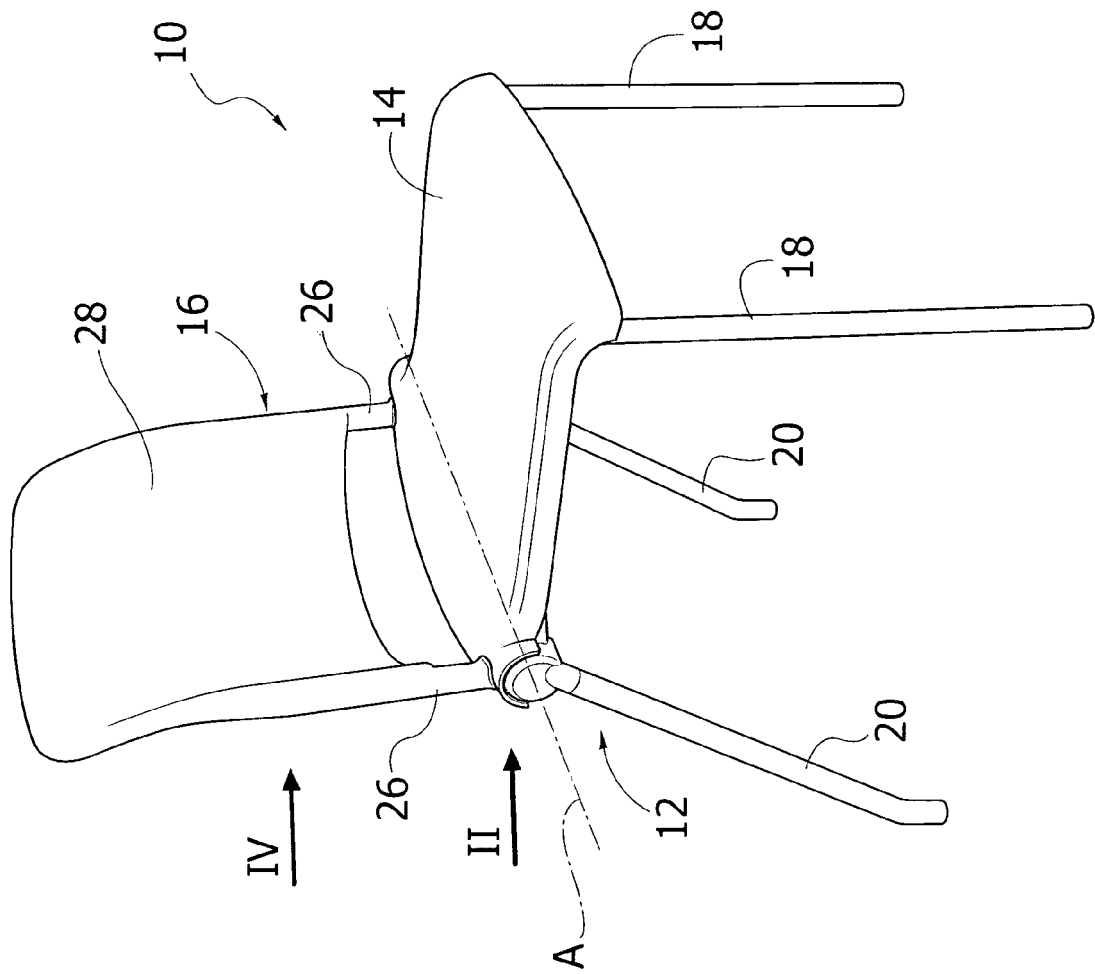
1. A chair comprising:

- a base structure (12);
 - a seat (14), carried by the base structure (12);
 - a backrest (16), comprising two lateral uprights (26) connected to a resting portion (28), the backrest (16) being articulated to the base structure (12) about a horizontal axis (A) and being mobile between a resting position and a position reclined backwards; and
 - an elastic mechanism (30), arranged for pushing elastically the backrest (16) towards said resting position,
- said chair **characterized in that** the elastic mechanism (30) comprises:
- two hubs (32), fixed with respect to the base

structure (12) and set at a distance from one another along said axis of articulation (A);
 - two rotating members (34), which engage the respective hubs (32) in such a way that they can turn about said axis of articulation (A), each of said rotating members (34) being fixed to a bottom end of a respective upright (26); and
 - two helical springs (52), set coaxially to said axis of articulation (A), each of said helical springs (52) having a first end (54) fixed to a respective hub (32) and a second end (56) fixed to a respective rotating member (34).

2. The chair according to Claim 1, **characterized in that** said hubs (32) and said rotating members (34) are connected in rotation to one another by means of a pin (46), which is fixed with respect to a respective hub (32) or rotating member (34) and engages in a rotatable way a hole (48) of a tubular portion (36) of a respective rotating member (34) or hub (32).
3. The chair according to Claim 2, **characterized in that** each of said helical springs (52) extends coaxially on the outside of said tubular portion (36).
4. The chair according to Claim 1, **characterized in that** said first and second ends (54, 56) of each of said helical springs (52) extend parallel to said axis of articulation (A) and are inserted within respective holes (58, 60) of the respective hub (32) and rotating member (34).
5. The chair according to Claim 1, **characterized in that** each of said rotating members (34) has a respective connection rod (40) inserted and clamped in a respective upright of a tubular shape (26) of the seat (16).
6. The chair according to Claim 2, **characterized in that** each of said rotating members (34) is axially connected to the respective hub (32) by means of a respective axial screw (64) that engages a threaded hole (66) of said pin (46).
7. The chair according to Claim 1, **characterized in that** said rotating members (34) and the respective hubs (32) are provided with respective end-of-travel devices, each of which includes a tooth (70) that engages an arched groove (72) having an angular dimension greater than the angular dimension of the tooth (70) and in which the resting position and the position of maximum inclination backwards are defined by the positions of bearing of said tooth (70) against the opposed ends of said groove (72).

FIG. 1



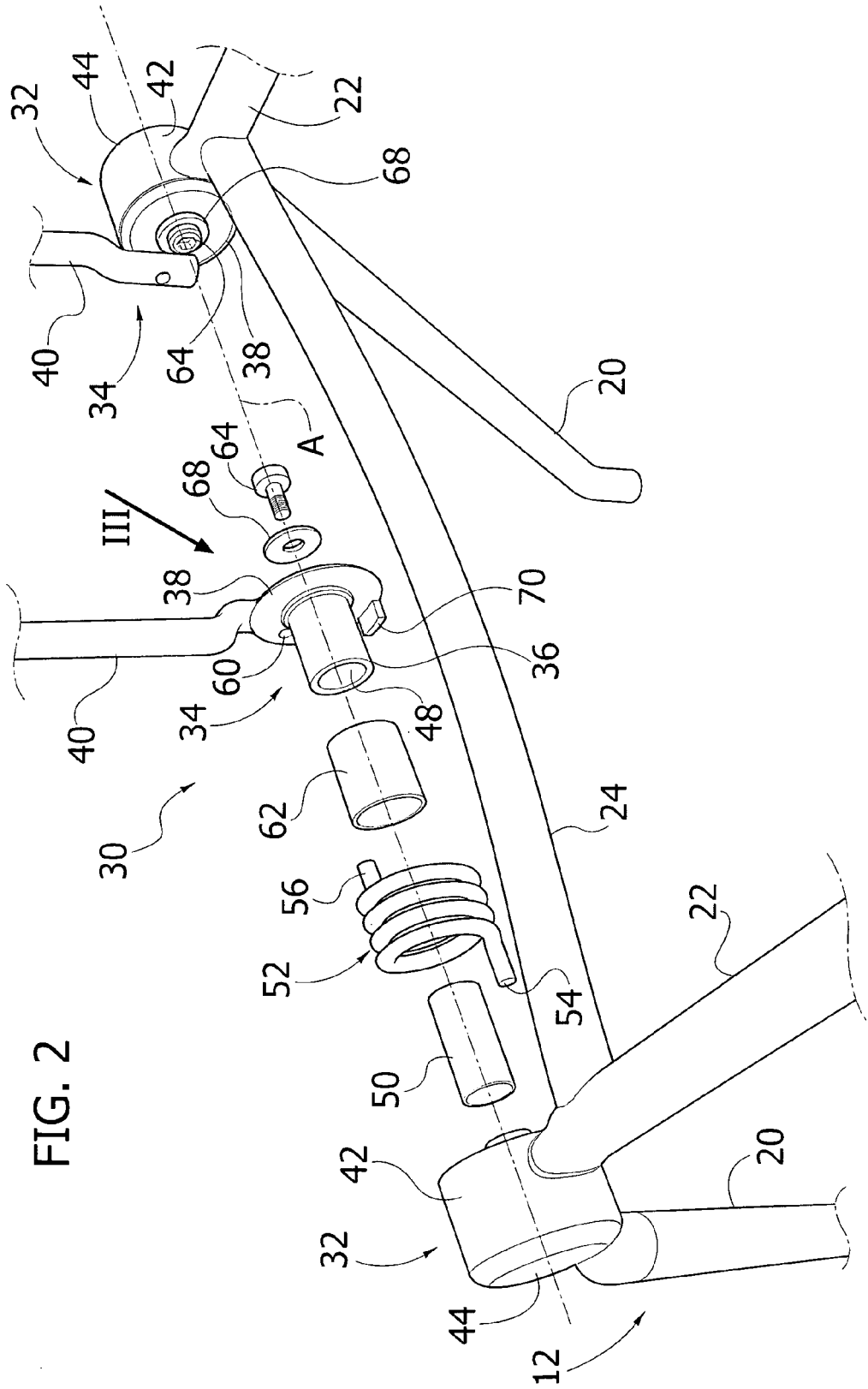


FIG. 2

FIG. 3

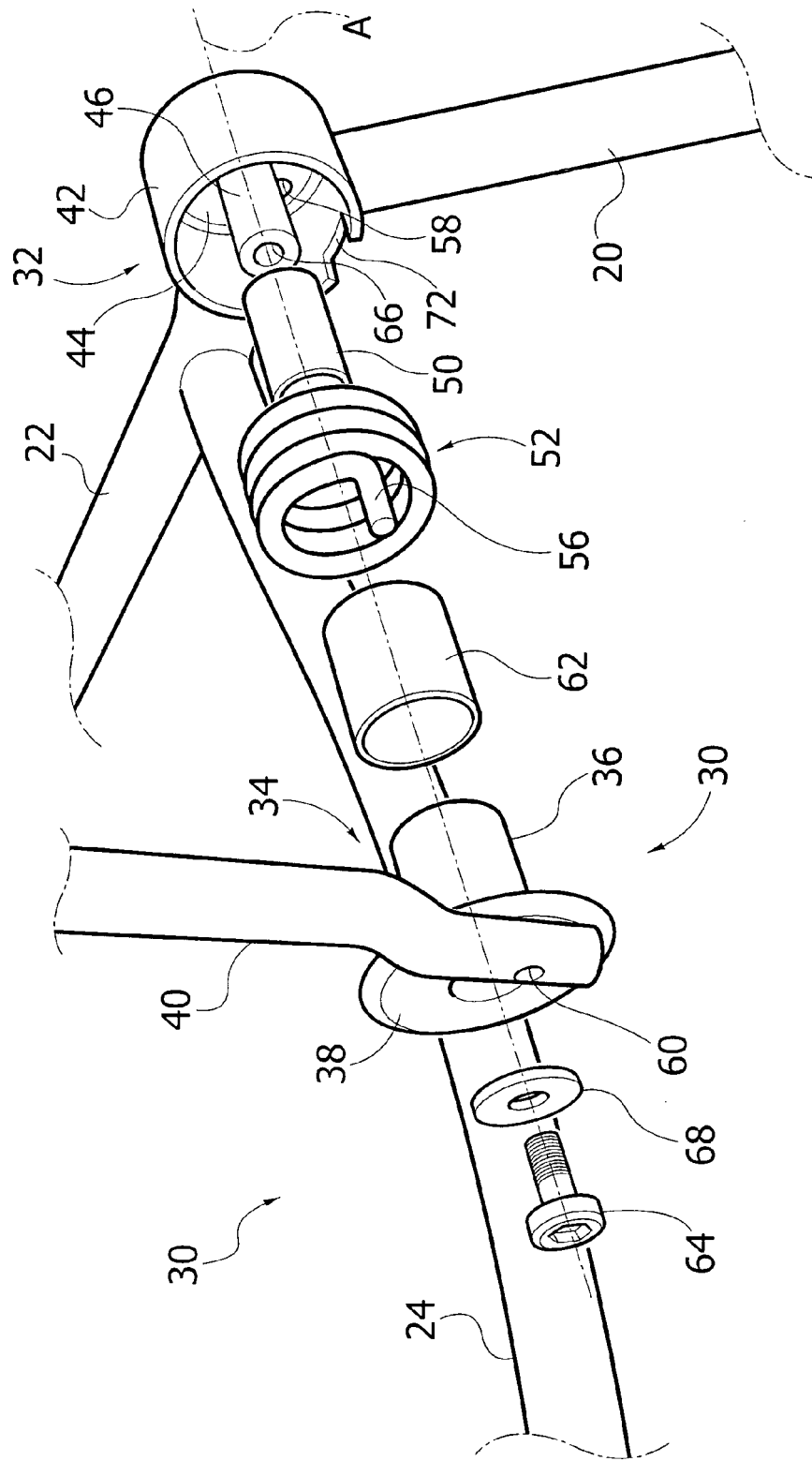
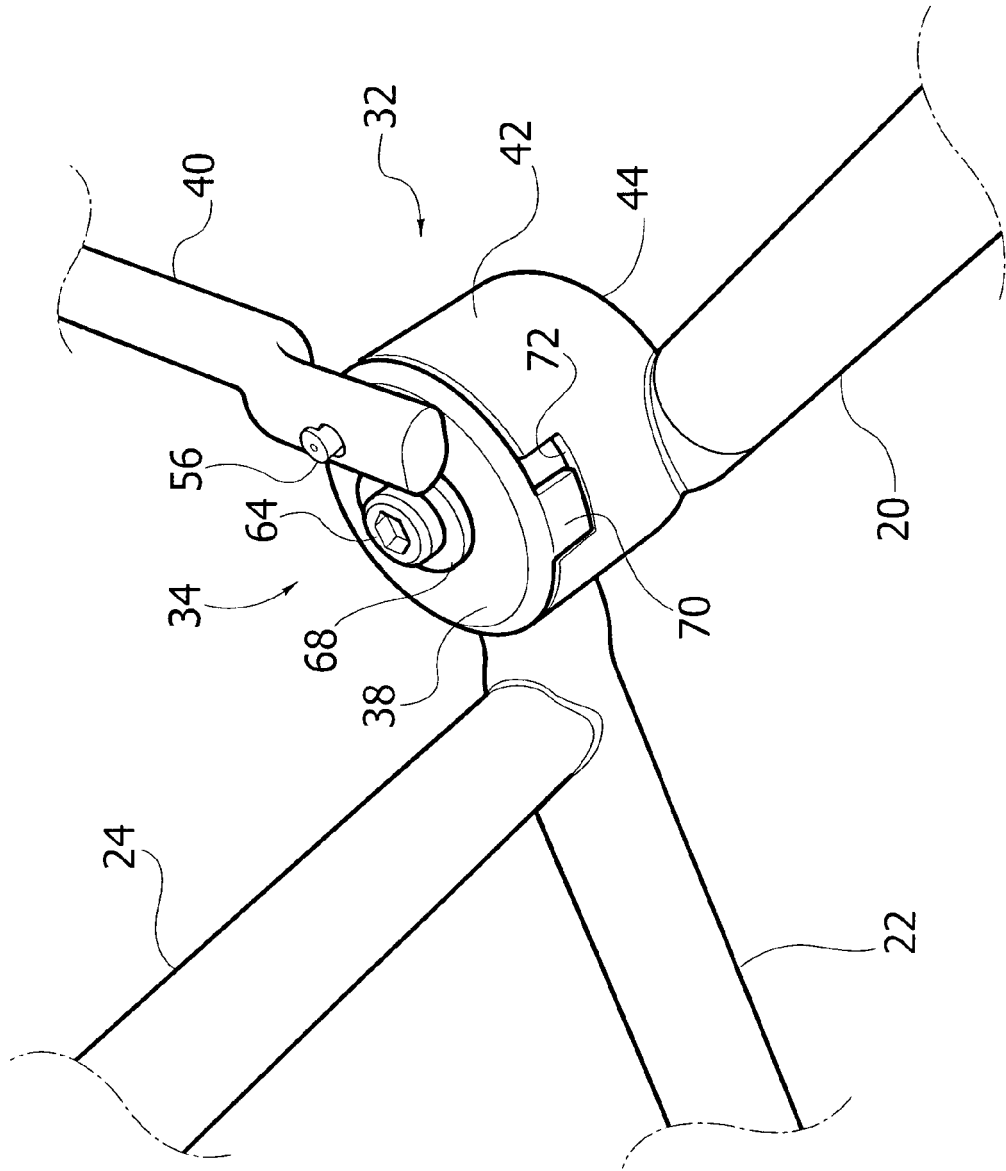


FIG. 5



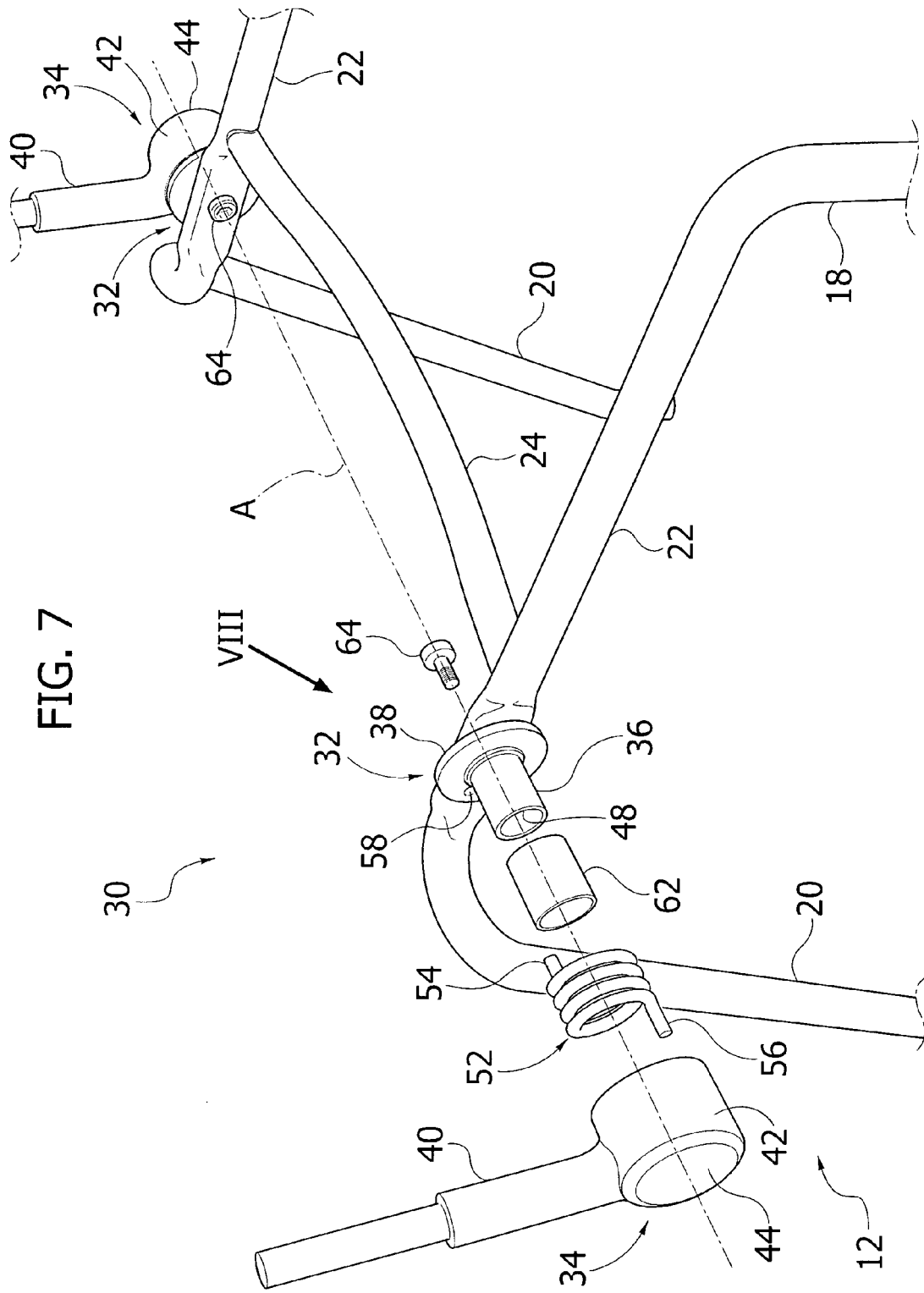
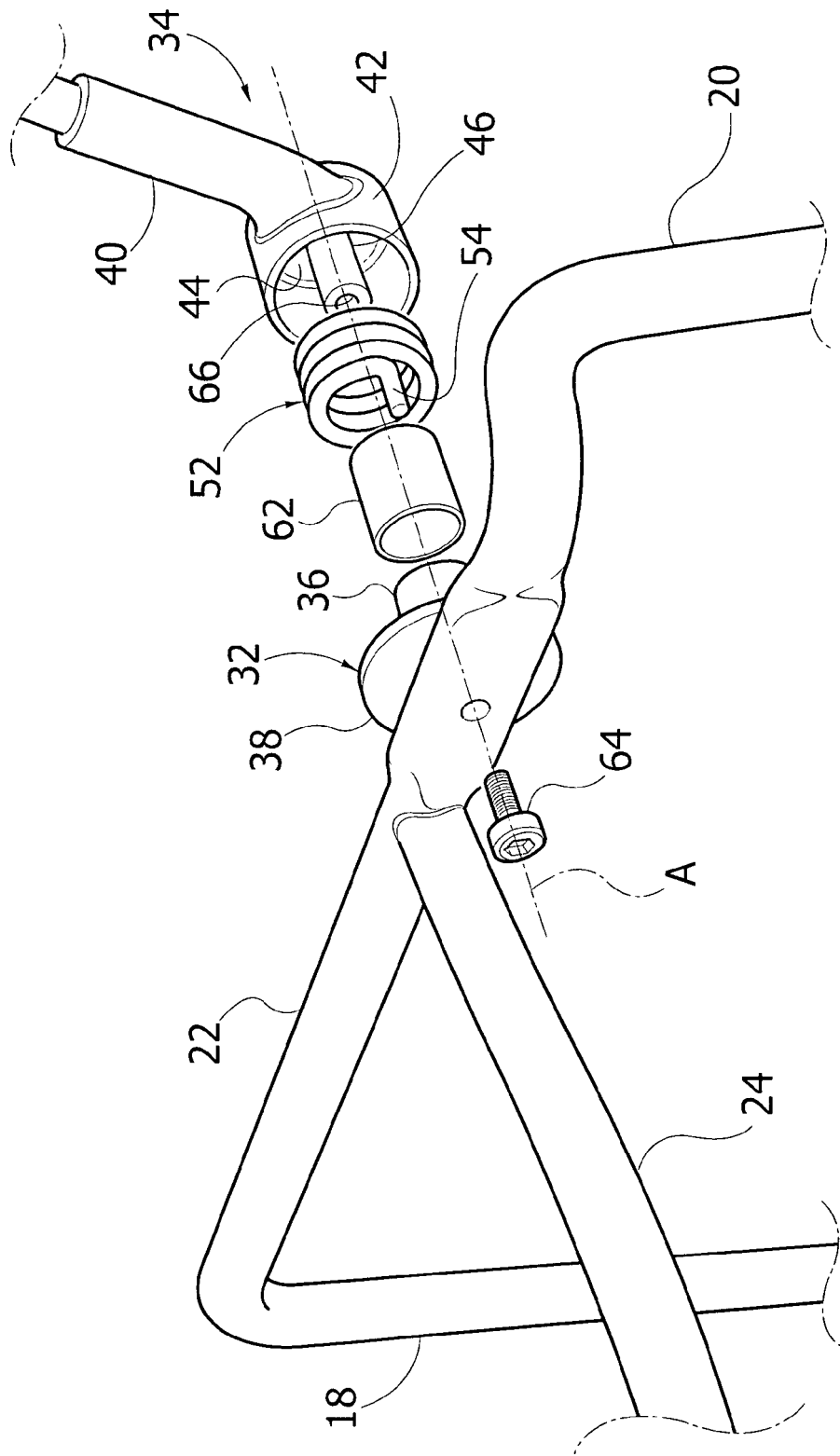


FIG. 8





EUROPEAN SEARCH REPORT

Application Number
EP 10 42 5009

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2006/096883 A2 (BRETTFORD MFG INC [US]; LUCHETTI ROBERT [US]; BUSHEY MATTHEW [US]; BROT) 14 September 2006 (2006-09-14) * abstract * * paragraph [0042] - paragraph [0045]; figures 5,11,12 *	1-6	INV. A47C7/44
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A	EP 0 626 146 A1 (PRO CORD SRL [IT]) 30 November 1994 (1994-11-30) * abstract; figures *	1-7	
A	WO 2007/087817 A1 (BOCK 1 GMBH & CO KG [DE]; BOCK HERMANN [DE]) 9 August 2007 (2007-08-09) * abstract; figures *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 April 2010	Examiner MacCormick, Duncan
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	

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ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 10 42 5009

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